FOOD MANUFACTURE

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The Editor will be glad to consider contributions from those engaged in the Food Industry. Articles intended for publication should be of a practical nature and accompanied by photographs or drawings when possible.

Peace on Earth

THE end of the road has been reached sooner than the most optimistic of us had anticipated.

The festival of peace has been celebrated in time-honoured fashion, but now that "the trivial round, the common task" has been resumed, there moves deep in the minds of most people a ground swell of awe and apprehension and a little of depression at what the atomic bomb may mean for them and their progeny.

Anxious enquiries as to peace-time applications of atomic energy are naturally met with non-committal answers from the experts. Such caution may be understood when it is realised that so little time has passed since the idea of the atomic bomb partook of fantasy.

Atomic energy will some day run a coalless world. It may sterilise foods and make them into prophylactic and curative agents in disease. Colossal sums have been spent and large numbers of scientists mobilised in the development of the atomic bomb. For successful and comparatively speedy results in the industrial field, will even a fraction of that money and those brains be expended?

Bacon Importation

Bacon importers have decided to ask the Ministry of Food to take the first steps towards the decontrol of bacon importation. The decision was taken at the annual meeting of the Bacon Importers' National (Defence) Association, Ltd.—the war-time association formed to implement the Ministry's bacon import policy. The meeting resolved to ask that "Bindal" should take over from the Ministry the landing, storage, and stock-keeping of imported bacon. The chairman of the Management Committee, Mr. F. L. Hirst, emphasised that the proposal was not to increase the strength of Bindal, but to prepare for the gradual handing back to importers of their normal businesses.

The meeting was strongly of opinion, however, that the proposals did not go far enough, and that the *tempo* for the decontrol of bacon imports should be quickened. Importers pointed out that they would very soon have a number of the former employees returning from the Services; but how

could they reinstate them while their business was still in the hands of the Ministry?

The chairman, replying to the criticisms, said that there were serious difficulties to be faced, and it must not be overlooked that while in war-time there was a centralisation of importing into the one channel, the exporting in other countries was also centralised, and they wanted the two things removed simultaneously. They did not want to find themselves in the position to import while others were not in a position to export.

Whale Meat Canning

As previously announced in FOOD MANUFACTURE, plans are now being made for a resumption of whale hunting in the Antarctic, several modern whaling ships having been recently launched. In addition to the programme described, it is hoped to develop a trade in whale meat, and one Scottish cannery has been mentioned as taking an active part in this work.

Whale meat was used for many years in the North of Scotland in the heyday of the Arctic whalers, being either processed like corned beef or used as whale steaks, which were a delicacy to older Orcadians who remember the whaling seasons in the north.

Whale meat is still cooked and preserved in the Faroes, according to Service men who have returned from that part of the world. The meat is cooked and sealed in stone jars, and remains good for a considerable period.

The Ice Cream Standard

In asking the two ice cream trade associations to make recommendations for a statutory standard for ice cream to come into operation after all ingredients are free from control, the Ministry of Food stated that its nutrition experts were of opinion that the basis of the standard should be the milk-solids-not-fat content.

This strikes a new departure in ice cream standards. In almost every country and state that has a legal standard for ice cream its basis is butter-fat. Several of these areas are large producers of milk and have surpluses of butter-fat available for manufacture into butter and for other purposes. An ice cream standard that provides for a minimum butter-fat content assists the milk producers in those countries.

Britain is in a different position. Before the war we imported 90 per cent. of the total quantity of butter consumed. An ice cream standard based on butter-fat would not assist the home dairy farming industry. The Ministry's nutrition experts, however, take the view that the standard to be adopted in this country should be fixed in the interests of the *consumers* of ice cream. The *per capita* consumption of butter before the war was approximately ½ lb. per week. The *per capita* consumption of milk-solids-not-fat compared unfavourably with that figure. In the opinion of the Ministry, increased consumption of milk-solids-not-fat is desirable among adults as well as children, and ice cream is one of the most suitable mediums for providing it.

The proposal does not necessarily mean that the statutory standard that may ultimately be introduced would not contain any reference to the fat content. It is generally believed that the two trade associations may not easily see eye to eye in regard to fat. Many members of the trade are of opinion that the standard should give manufacturers complete freedom of action to use butter, margarine, 100 per cent. vegetable fats, fresh cream, and so on as they think fit; also that no restriction should be placed on the type of sugar that may be used.

The Ministry has thrown out a hint that no distinctions in the designation of ice cream will be tolerated. Thus, the use of the terms "ice cream," "cream ices," and "ices" to distinguish different qualities of products will not be permitted, the official view being that it would lead to confusion, and possibly to hardship.

The first meeting between representatives of the Wholesale Ice Cream Federation and the Ice Cream Alliance in regard to the standard will be held this month.

Water as a Nutrient

In view of the importance of water as a nutrient —a matter, thanks to war-time research, upon which our knowledge has increased—the Water Act, which received the Royal Assent last June and will impose on the Ministry of Health for the first time the duty of promoting the provision of a water supply coming more in line with such research, is a step forward.

The positive influence of water supply on health is discussed in an article (*Lancet*, July 7) by Murray and Wilson, who point out that there are now about 1,000 water undertakings in England and Wales operated by local authorities, joint water boards, or water companies with express statutory powers, as well as a number of non-statutory bodies and small private concerns about which little is known.

The authors point out the lack of standards to indicate the minimum content of any mineral which should be present, and review recent research which emphasises the health aspects of the mineral found in water. Mention is made of recent surveys in America and South Africa, which have shown a relation between the degree of hardness of water and the incidence of caries which seems to indicate that hard water may protect against dental caries, in spite of the fact that in 1925 a committee of the Medical Research Council con-

sidered that no significant correlation existed between dental caries and softness of water supply. The authors are of the opinion that a large-scale investigation into the relations between enamel structure and water hardness would be worth while.

Calcium, iodine, and fluorine are important constituents of a drinking-water supply. Lack of calcium may interfere with calcification of bones and teeth; lack of iodine may lead to enlargement of the thyroid gland; and lack of fluorine may favour the development of dental caries.

In some districts it may be necessary to employ alternative supplies calculated to give a water of desirable mineral content, or even a mixture from several sources, in order to meet both health and nutritional requirements. But such adjustments in composition will not ensure an adequate supply in every household, because there may be environmental reasons which prevent the proper utilisation of the water supplied.

Coffee and Deficiency Diseases

A paper by L. J. Teply, W. A. Krehl and C. A. Elvehjem of the University of Wisconsin deserves the attention of all concerned with coffee and coffee extracts. The paper appeared in the January issue of *Archives of Biochemistry* (Vol. 6, 1945, pp. 139-149) under the title "Studies on the nicotinic acid content of coffee." The investigation began when, in the course of routine analyses of army rations, solubilised coffee powder was found to contain enough nicotinic acid to warrant further enquiry. Nicotinic acid assays were first made by the microbiological method of Snell and Wright; later, assays were made with the aid of chicks and dogs, and studies on the rat were also made.

Nicotinic acid was found to be very readily extracted from roasted coffee. Roasted coffee as bought contained about 11 milligrams of nicotinic acid per 100 g. Coffee bought as beverage in restaurants contained on an average about 1 mg. per cup of about 175 ml. Green coffee behaved quite differently from roasted coffee in respect of nicotinic acid activity. Water extraction of green coffee yielded only about one-tenth as much nicotinic acid as did similar extraction of roasted coffee. Some discussion of the activity of green coffee and of the substances possibly present in it is presented, it being evident that the roasting process causes a definite change in the nicotinic acid derivatives of coffee.

Tests showed that the material in coffee was equally active for dogs and for *L. arabinosus*, so that the results from microbiological and dog assays were comparable. Dogs placed on a basal ration containing biotin, *p*-aminobenzoic acid and inositol plus nicotinic acid with added roasted coffee or coffee extract showed a variety of remarkable symptoms, but in the experience of the authors no such effects occurred in dogs receiving the basal ration plus nicotinic acid but without coffee. Addition of 5-10 per cent. of roasted coffee to the diet of rats on a basal ration produced poor growth, with alopecia (loss of hair) in some instances. Caffeine had a similar but less marked effect; decaffeinated coffee retarded growth, but did not induce loss of hair. These conditions may have been due to precipitation of a biotin deficiency.

The author says: "Our results with black-tongue dogs indicate that coffee drinking may produce a number of effects in humans. In individuals on poor diets, ingestion of coffee may help to produce vitamin deficiencies. . . . However, if this effect is obviated, coffee may actually be able to prevent nicotinic acid deficiency in humans, and it seems reasonable to assume that individuals in a fairly good nutritional state could utilise the several mg. of nicotinic acid that would be furnished by drinking several cups of coffee per day." They quote De Castro (a Brazilian) as saying that there is no pellagra zone in Brazil, where pellagra is a clinical rarity. Extensive coffee consumption may account for this, since the average Brazilian solid diet seems to be quite low in nicotinic acid and contains the classical "pellagra-producing" item: maize.

Food for Argentina

The Argentine Republic produces most of the varieties and classes of foodstuffs grown normally in temperate and subtropical climates, and food is cheap. It is one of the world's largest exporters of meat, grain, fruit, and vegetables. Since the country extends north and south, the seasonal demand for such items as berries, tomatoes, and fruit are met from domestic sources. There is a large production of citrus fruits, although oranges are imported to some extent seasonally from Brazil. There is a large export of apples, but some special varieties are imported, in limited quantities, for the Christmas trade, and the country produces its own necessities in sugar and rice.

Argentina has important river and sea fisheries, but the people are consumers of beef rather than fish, although Spain, Portugal, and Norway ship a limited quantity of tinned sardines, which sell as a specialty. Norway and Scotland supply dried codfish, largely for the Lenten season, which sell on a quality basis rather than to the low-income groups. California sends dried prunes, but local supplies of this fruit are largely sufficient. Nuts from Chile and California are consumed. The United Kingdom sells some food specialties, such as English biscuits, mainly as luxury items. Argentina normally is self-sufficient in potatoes, but imports some seed from North America.

In general, imports of foodstuffs—apart from coffee, cocoa, and bananas from Brazil, and tea and spices from the Far East—are food specialties for the foreign-born groups.

As one of the largest surplus-food-producing countries in the world, farm products comprising more than 80 per cent. of the entire export trade, Argentina must find markets abroad for food products, the principal individual consumer being the United Kingdom. The Republic is therefore influenced by the trade policies and the general attitude of the United Kingdom.

There has been an enormous expansion in manufacturing, processing, and canning of foods, and there is evidence of the intention in official quarters to preserve a large part of these new industries in order to maintain a "more balanced economy."

Argentina has come through more than five years of war-time conditions, which have been marked by a virtual elimination of imported civilian consumer goods from the markets, but no shortage in goods generally. This has made a deep impression on public opinion. The country will therefore export as largely as possible its surplus foods and in exchange take raw materials for its manufacturing industries.

Dry Buttermilk

It is suggested that more complete manufacturing of dairy products may see such a joint-product enterprise as butter-making—already done co-operatively in creameries—combined with the manufacture of dry buttermilk. Nearly 90 per cent. of the U.S.A. production of dry buttermilk comes from the north-central States: Minnesota produces about 47 per cent. of the total national output, Iowa and Wisconsin over 9 per cent. each, and Michigan about 7 per cent. Most of the dried buttermilk is sold to manufacturers of animal feeding stuffs, the remainder being largely sold direct to farmers. Roller driers are often used. The issue for May, 1945, of the *Iowa Farm Economist* gives these facts and the possibilities in a programme of producing dry buttermilk, and discusses new uses and demands for the product, including the advantages of dry buttermilk as a protein supplement in human food, and the importance of cost and quality standards in relation to the latter.

Milk and Tuberculosis

At the closing session of the representative body of the British Medical Association, considerable interest was aroused by a motion, submitted by Mr. A. Lawrence Abel, and carried with little dissent, instructing the council to insist that the Ministry of Health and the Ministry of Food should secure legislation immediately requiring all milk for human consumption to be pasteurised.

Mr. Abel said that in the great majority of cases of bovine tubercle infection, the disease occurred in parts of the body other than the lungs, but of all non-pulmonary tuberculosis that type of infection accounted for about 30 per cent. of the cases. In England and Wales in 1943 there were some 4,000 deaths from non-pulmonary tuberculosis, of which it might be argued that some 1,200 were due to bovine infection. In the same year some 14,000 notifications on non-pulmonary tuberculosis were made, of which it might be presumed that some 4,000 were due to bovine infection.

Pointing out that about 600 children died in 1943 from bovine infection, Mr. Abel said he thought that the money of the B.M.A. should be spent in indicting the Ministries of Health and Food at the Old Bailey for the deaths of the children.

Dr. Guy Dain said he thought the time had come when the sale or distribution of unsafe milk should be made a criminal offence.

Kitchen Work

In the midst of a world of wireless, of radar, and other marvels, the average kitchen is wallowing only a few steps from the Stone Age. Several times a day that revolting operation "washing up" has to be faced either by the luckless domestic or in these days by the housewife herself.

The glow on the face of the bride must fade when she arrives at the scullery sink and realises that, at fixed and inexorable periods, she will be engaged in the handling of greasy plates, with half-dried and very adhesive mustard at the rims and ugly remnants of food to be scraped and scraped. It seems strange that women, if not sufficiently inventive to devise something better, have not urged their men to do so.

In the U.S.A., the Maxton Food Company, who provide food for aeroplane passengers, have been looking ahead to the day when prepared meals will come, metaphorically, off a belt line.

"It is not enough to have precooked meals," states *The New Yorker*, "they must arrive in an edible container. All plates, all utensils should be made of some humble legume, firm yet palatable, with a glazed finish. Then when the meal is over and the last dish has been eaten, there will be no trace of the ugly occasion. . . ." This is an idea, but we wonder whether the best of humble legumes would be attractive as a "savoury," and also what is to be done with the discarded gristle, the chop bones, the olive stones. And we tremble to contemplate a six-course meal, although the thought of festive diners polishing off their plates after each course may have its attractions for the humorist.

Special Dehydration Number

Readers are advised that a few extra copies of the August issue of FOOD MANUFACTURE are available.

To avoid disappointment, application for these should be made as early as possible.

Hygiene and Canning Practice

This article discusses briefly the necessity for the observation of strict hygienic principles throughout the manufacture of canned foods. One of the fundamentals of sound canning practice is for the food to be as free as possible from micro-organisms when ready for retorting. It is obvious that the raw materials, plant and equipment with which ingredients come into contact, the time factor between the preparation of a batch of raw material and the filling into cans, the cleanliness of the atmosphere, etc., will all play a part in influencing the number of bacteria present in the unretorted finished product.

T. E. BASHFORD,

Research Department, The Metal Box Co., Ltd.

THE DEGREE of infection in canned foods at the time they enter the processing retort is important because, in addition to actual heat tolerance, the destruction rate of bacteria in a given medium is dependent upon the number of organisms in that medium.

The heating processes given to low or semi-acid canned foods—*i.e.*, those with *p*H values above 5·5 or between 4·5 and 5·5—are designed so as to be adequate for the destruction of *Cl. botulinum*, the most heat-resistant pathogen known, and to destroy the other types of micro-organisms capable of developing under the climatic conditions to which the pack is to be subjected. This latter condition is often only fulfilled provided the initial bacterial population is normal for the particular product, the retorting time and temperature being insufficient to destroy excessive numbers of organisms.

Effect of Bacterial Concentration

Since quite early in the history of bacteriology it has been observed that when bacteria are subjected to lethal temperatures or to some other disinfecting medium the micro-organisms are not all killed at once. They do not, however, behave like the higher organisms, where the majority die off at the same time, with the remainder showing lesser or greater tolerance to the killing agent, but react more or less as chemical substances fulfilling certain conditions of established physico-chemical laws.

The destruction of bacteria is a regular process, and under controlled conditions it is found that the largest number dying in a series of given equal time intervals do so in the first interval, and the number killed in each succeeding period is a constant proportion of the number of live organisms surviving in the test suspension. This being so, it follows that the greater the number of organisms initially present in a suspension the longer will be the time required at a given temperature or concentration of disinfectant to effect sterility. For instance, if it is assumed that 10,000 spores in the centre of a can are destroyed during retorting at the rate of 90 per cent. per 5 minutes, then after the first 20 minutes only one organism will remain, and for the purpose of this example the can would be sterilised by 25 minutes' heating. Now if a can had one million spores instead of 10,000 in the centre at the beginning of the process and the processing time remained the same, there would still be 10 spores alive after 25 minutes' heating, and 35 minutes would be required to give sterility. (See Table 1.)

The destruction rate of bacteria follows a logarithmic order, and if the logarithms of the numbers of surviving cells are plotted against time a straight line results.

The effect of numbers of bacteria on sterilising time is further illustrated by the data in Tables 2 and 3. These observations were published by Bigelow and Esty[1] and by Esty and Meyer.[2] Bigelow and Esty's report gives additional figures for heating conditions other than at 115° C. (240° F.), but for the sake of clarity these have not been reproduced here.

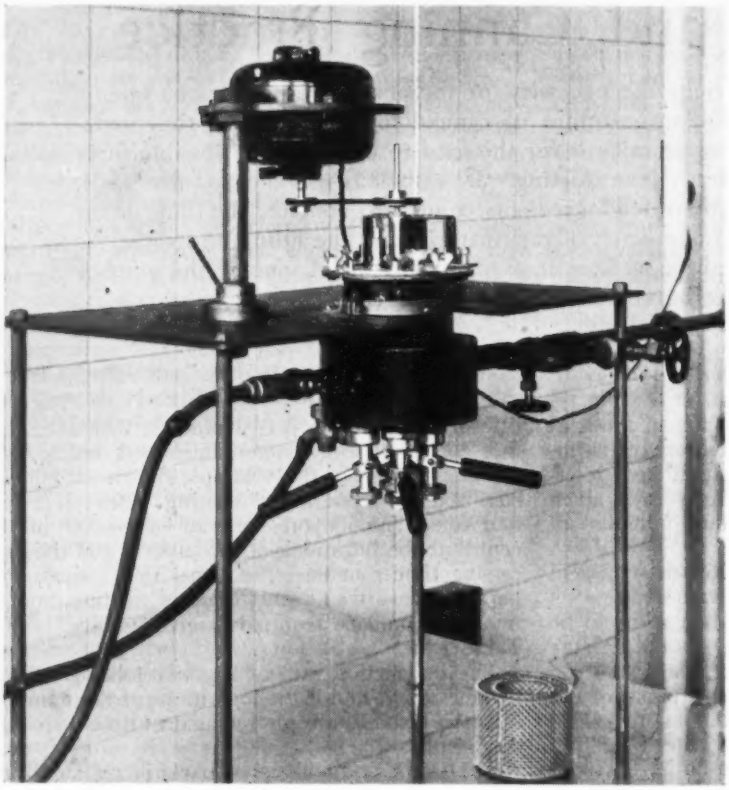
Infection from Cannery Plant

Contamination from factory machines and implements, alone or as a contributory factor, has been responsible for spoilage losses. Wooden equipment offers a particular problem, since, owing to the porous nature of the surfaces, it may be superficially clean, yet harbour infection to be picked up by whatever comes into contact with it.

TABLE 1.

A Theoretical Consideration of the Effect of Initial Bacterial Load on Sterilising Time.

Time in Minutes.	*Can 1. No. of Spores.*	*Can 2. No. of Spores.*
0	10,000	1,000,000
5	1,000	100,000
10	100	10,000
15	10	1,000
20	1	100
25	Sterile	10
30	—	1
35	—	Sterile



Apparatus for the determination of the death-rate of bacteria when subjected to heat. Similar apparatus was first described by C. C. Williams, C. M. Merrill, and E. J. Cameron.

The literature[3, 4, 5] shows spoilage thermophiles to have developed in holding tanks, blanchers and filling machines. One feature was the build-up of the infection during the time the plant was not in operation. Consequently, heavy contamination occurred in cans filled during the period immediately following the morning start-up and lunch-time breaks. Improvements were observed by instituting washing and flushing of the plant in the morning and before starting again after any other break, in addition to the normal cleansing given at the close of the production run.

TABLE 2.

EFFECT OF INITIAL CONCENTRATION ON TIME NECESSARY TO DESTROY THE SPORES OF TYPICAL THERMOPHILES. (*Bigelow and Esty*, 1920.)

Culture No.	*Number of Bacterial Spores per c.c.*	*Minutes Required to Destroy Spores at 115° C. (240° F.).*	
		Survived.	*Destroyed.*
26	200,000	80	84
	20,000	70	72
	2,000	55	60
1592	115,000	66	70
	10,000	48	50
1493	175,000	55	58
	5,000	45	50

The author during a recent plant survey isolated heat-resistant thermophiles from a wooden framework situated inside a steam-heated continuous exhauster. Uncovered cans were being conveyed through the box, and it was possible for condensed steam accumulating on the wooden supports to carry the infection into the cans. In other instances of spoilage investigated, the rotary brushes from passing (sieving) machines and pipelines with blanked-out T-junctions in place of gradual bends were found to be adding resistant organisms to the material fed through them. The introduction of mass production methods to the canning industry has led to the development of complicated machines which are sometimes difficult to clean and sterilise.

Cameron[3] reports some interesting observations with water flume systems, and he found one hot water plant operating under such conditions as to create a definite spoilage hazard. The water in this particular system was re-circulated through the flume and back to a reservoir, the operating temperature being 65·6° to 76·7° C. (150° to 170° F.). The entire system was cleaned during the night and noon breaks, and the reservoir filled with fresh water. After each refill, negative counts were obtained for thermophilic spoilage organisms, but as packing progressed spores appeared and the num-

bers increased sufficiently to be regarded as dangerous.

Ingredients and Raw Materials

It may be said that in general all the raw materials and ingredients used in the manufacture of canned foods will add to the total numbers of organisms in the product filled into the can. A possible exception is the bulk canned products such as fish and tomato purée, although it is fairly well known to canning microbiologists, as Crossley[4] has shown, that a proportion of these will almost certainly contain viable bacterial spores.

As the result of the American workers finding sugar and starch to be carriers of spoilage thermophiles, these raw materials have probably received most consideration. For some years past it has been possible in the U.S.A. to obtain sugar specially prepared for use by the canning industry. In 1939 Hirst[7] announced that similar supplies were available in this country, and it is understood that sugar with a low thermophile-spore content is still procurable. With regard to flour, the American procedure is to use supplies in the cannery with a known and suitably low thermophile content, segregated by direct bacteriological examination. Although this is done by some canners in this country for those packs found particularly difficult to sterilise, wider application would almost certainly demonstrate its advantages. Methods of examination together with the standards recommended by the National Canners Association of America are given and fully discussed by Clark and Tanner,[8] to mention only one publication.

Spices, seasonings, and colouring agents have been given attention[6, 9, 10, 11], and in some cases have been found to be quite heavily infected with bacteria. Fortunately the quantities of these ingredients used are relatively small per batch of raw mixture, and experience suggests that they do not present a serious problem so far as canned foods are concerned. Jensen, Wood, and Jansen[12] reported the tracing of spoilage in canned chopped hams to infection brought in by spices. This product, however, was prepared from cured meat and probably was not given a heat process comparable with ordinary packs.

By inadequate pre-treatment of raw materials, particularly root vegetables, it is possible to transfer spores to the foodstuff canned. Thorough washing and frequent change of water coupled with some abrasive process is generally sufficient to reduce the infection to safe limits. Under well-controlled conditions of cleansing, however, the writer is aware of instances where abnormally heat-resistant strains of spoilage thermophiles have been conveyed to cans by vegetables. Subsequent culture tests confirmed that these organisms existed in the soil of certain growing areas, and the difficulty was overcome by refraining from the use for canning of supplies gathered in these districts.

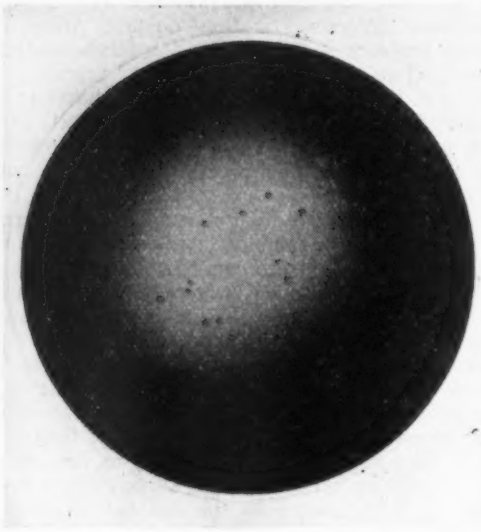
The filling of cans should be proceeded with as rapidly as possible after the preparation of the food. Souring and/or fermentation of a moist food mixture may occur in an hour or so if stored in a warm room and large numbers of spores can develop in batches held for longer periods or overnight. To cite an instance, two batches of a meat and vegetable mixture became surplus to requirements owing to machine difficulties. These had been heated and were still warm when it was decided to place them in the refrigerator for use on the following day; they were then canned and processed. Later a high proportion of the cans became blown, owing to the development of thermophilic anaerobes. These cans were the only ones to blow in a large

TABLE 3.

RESULTS OF TESTS MADE TO DETERMINE RELATIONSHIP OF CONCENTRATION OF SPORES TO HEAT RESISTANCE.

(*Esty and Meyer, 1922.*)

Strain.	*Number of Spores per 1 c.c.*	*Resistance in Mins. at 105° C.*		*Resistance in Mins. at 100° C.*	
		Survived.	*Destroyed.*	*Survived.*	*Destroyed.*
90	900,000,000	44	48	—	—
	9,000,000	34	36	—	—
	90,000	18	20	—	—
	900	12	14	—	—
	9	—	2	—	—
90	628,000,000	33	36	—	—
	6,280,000	33	36	—	—
	62,800	24	27	—	—
	6,280	15	18	—	—
	628	10	15	—	—
	63	—	5	—	—
97	72,000,000,000	—	—	230	240
	1,640,000,000	—	—	120	125
	32,800,000	—	—	105	110
	650,000	—	—	80	85
	16,400	—	—	45	50
	328	—	—	35	40



Acid production by "flat-sour" thermophiles as evidenced by a colour change from purple to yellow in the indicator added to the culture medium.

number packed over a period of several days, and they were traced from the can code markings.

Air-Borne Infection

Atmospheric infection is of extreme importance to some food industries, but generally speaking does not present a major problem to canning. Obviously clean air is desirable and the careless handling of powdered materials near to manufacturing lines should be guarded against.

Baumgartner and Wallace[13] isolated an exceptionally heat-resistant strain of sporing anaerobes from air-borne dust containing animal fur while investigating potential sources of anaerobic contamination. It is known that spoilage in canned foods prompted this enquiry, and the organisms in the fur dust were shown to be identical with those grown in cultures from blown cans. The dust arose from a factory adjacent to the canning plant.

Cooling Water

The quality of the water used for cooling processed cans cannot, of course, influence the bacterial population of the pack at the time of retorting, but the hygienic condition of the water is of such paramount importance to the canning industry that its possible effects will be discussed here.

It is essential that all water coming into contact with food in a cannery must be of potable quality, and even if used only for the cooling of cans after processing it must conform to the same standards for sterility. This fact is not always appreciated by canners, and some have discovered to their cost that spoilage will and does arise from cooling cans with seams of accepted mechanical tolerances in water carrying high bacterial populations.

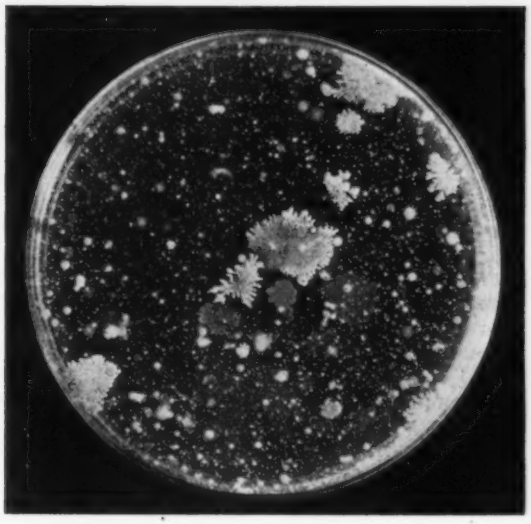
When the double seam of the sanitary or "open-top" can is formed, metal from the can body and end is rolled together in such a manner that the two parts of the can become interlocked and any spaces remaining in the join thus produced are sealed with a liner of rubber or similar compound which has been pre-deposited on to the can-end. How then do the bacteria in the cooling water gain entrance to the can to spoil the contents, and what effect on spoilage has the number of organisms present in the cooling water?

Firstly, if the size of bacteria is compared with the mechanical limits to which a can should be manufactured or closed under commercial conditions it becomes obvious that even good seams are not necessarily barriers against bacteria. The bacteria vary in size and may be as small as 1/125,000 of an inch (0·2μ), the majority being about 1/50,000 of an inch in width (0·5μ), while the engineer cannot control the dimensions of his seams to less than 1/1,000 of an inch. If, therefore, a seam should have a gap of 1/10,000 of an inch between the layers of metal of which it is made, micro-organisms of this size and less could pass through the gap into the can. The function of the lining compound is to prevent this entry, and in fact in most seams does so, but it is believed that the continuity of the liner or the formation of the seam may become temporarily disturbed from a variety of factors during the filling of the can and subsequent operations, so that when such disturbances coincide with the minute channel in the seam the way is open for the passage of bacteria. The factors concerned are chiefly bound up with the pressures developed during retorting, but also involved are the conditions of closing, the type of product in the can, and rough handling of the closed container.

It is during the cooling period after the cans have been processed that the most favourable conditions are attained for micro-organisms to enter the can. As the temperature of the can and contents falls the internal pressures built up during processing are relieved and a vacuum is gradually created, and it is then that minute droplets of water may be drawn into the can. The amount of water entering, however, is extremely small and would show no effect on the amount of vacuum if this should be ultimately recorded by ordinary methods. The fact that the quantity of water is of such minute proportions makes the degree of contamination in the cooling water of so much importance. The larger the number of bacteria per unit of volume the greater are the chances of their being carried into the can.

Spoilage outbreaks arising from the use of heavily infected cooling water have been ex-

Bacterial colonies developing from 1 millilitre of mains water.



Colonies from 1 100th of a millilitre of infected cooling water giving rise to spoilage difficulties.

perienced both in this country and in the United States, and canning technologists now realise that cooling water should not contain more than 50 or so viable organisms per 1 millilitre. One way to obtain suitable water is to use the local authority's drinking supply, running it to waste after cooling each batch of cans. This, of course, is not always possible—for instance, in country districts where approved water supplies are limited or non-existent, or when the cost of such a procedure is prohibitive.

Chlorination of Cooling Water

Alternative supplies are usually drawn from lakes, rivers, canals, etc., or a re-circulating system may be installed using water from one of these sources or from the mains supply. In each of these cases it is necessary to sterilise the water by chlorination. Chlorination is a process which has been in operation for a number of years in the purification of public water supplies, and it is accomplished by adding relatively small quantities of the disinfectant chlorine to the water under controlled conditions. Since, however, the water used for public supplies is clarified and filtered before chlorination the amount of chlorine necessary to effect sterility is much less than that required to treat a cannery supply, where filtration is usually impracticable. In considering recirculated cooling water it must be remembered that organic matter is continually being added from the outsides of the cans, and this again necessitates the use of larger amounts of chlorine.

Scott[14] carried out some of the earlier work on this sterilising question and his findings are of interest. He cooled canned corn in water carrying the normal bacterial infection of the cannery supply and compared the number of blown cans obtained with those from batches cooled in the same water having a residual chlorine content of 1 to 15 parts per million, the chlorine reducing the bacterial count to 0·1 organism per 1 millilitre of the treated water. His results (Table 4) serve to illustrate the degree of spoilage which may occur when grossly infected water is used.

In the light of our present knowledge a chlorine residual of from 1 to 2 p.p.m. with a contact period with the water of not less than 20 to 30 minutes is usually aimed at, but every source of water and its supply arrangement needs to be reviewed on its own merits. It is recommended, therefore, that sterilisation of cooling water is not attempted without guidance and assistance from a water-treatment specialist or a technologist with experience of the problem. The following experiment conducted in these laboratories emphasises this point. The

TABLE 4.

Can Size.	*Product.*	*Swelled Cans per 1,000.*	
		Chlorinated Cooling Water.	*Non-chlorinated Cooling Water.*
307 × 302	Vacuum packed corn	0·46	3·44
603 × 408	,, ,, ,,	0·39	5·17
303 × 406	Cream style corn	0·29	1·17
603 × 700	,, ,, ,,	1·37	7·80

investigation arose from the finding of quite large numbers of viable organisms in cooling water treated with approximately 1 p.p.m. of chlorine for a period of 20-30 minutes. The supply was drawn from a comparatively clear but shallow river. After rain, however, the water took on a turbid appearance due to suspended soil and sand. For the investigation, suspensions of coliform organisms were prepared in normal clear water and in the same water containing 1 gm. of sterile soil per 100 ml. of water; this was sufficient soil to make the water quite turbid. Chlorine was added at intervals to maintain a residuum of 0·8 to 1·0 p.p.m. throughout the test, which was observed over a period of 1 hour, with plate counts being made at the commencement and after 20, 40, and 60 minutes.

TABLE 5.

	Water containing Sterile Soil.	*Normal Clear Water.*
0 min.	1,500,000 orgs./1 ml.	1,850,000 orgs./1 ml.
20 ,,	340,000 ,,	Sterile
40 ,,	12,000 ,,	,,
60 ,,	680 ,,	,,

These findings were confirmed by two repeat experiments, and it was demonstrated that reduced amounts of added soil increased the efficiency of the chlorine.

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The Cup of Tantalus

It has been said by some that Tantalus, a king of Lydia, son of Jupiter by a nymph called Pluto, stole away the nectar and ambrosia from the tables of the gods, when he was admitted into the assemblies of heaven, and gave it to the mortals on earth. His punishment is proverbial.

M. Andre L. Simon, the author of the latest cookery book,[1] unfortunately has not been able to steal anything corresponding to these delectable products for our use, but has set before us an account of them for which, because of the things we are about (sometime!) to receive, thanks rather than punishment are due.

The book is a recapitulation of recipes mostly culled from the Wine and Food Society's Concise Encyclopædia of Gastronomy, ranging over fish, flesh, fowl, fruit, and vegetables. Sections on cake-making and confectionery are also included.

Before getting down to the recipes, the author gives us eleven pages of observations on taste, cooking, and nutrition which, were they not couched in terms of subtle Gallic humour, might savour of dogma.

The English *gourmet* may take heart from M. Simon's dictum: "All I have attempted to tell you in this little book is what I, a Frenchman, consider the finest fare of the British Isles, the kind of fare which is not only as good as the best one may get anywhere else in the world, but the kind that is better here than anywhere else, if and when given a fair chance by the cook."

The recipes are based on simple methods, and while their perusal may be tantalising under present conditions (at the time of this writing sundry rations have been reduced) they may induce pleasurable anticipations of real meals to come.

In Sussex in the late summer of 1923 I combined that over-rated pastime with the ugly sounding name—hiking—with a search for a poultry farm on behalf of one of that band of exiled Englishmen whose dreams during many dusty, clammy years in the tropics have been of "a cottage in the country" where they could eke out a scanty pension by working on the land.

Poultry farms there were at every turn of the road and nearly every one of them displayed a board: TO BE SOLD. Almost without exception they were depressing. I thought at first that this might be due to the rain, but the sudden break in the low clouds which permitted the sunshine to illumine the infinite shabbiness of the *ensemble* told me I was wrong.

I interviewed some of the would-be vendors. Seldom could have been seen such hungrily wistful human beings who grasped eagerly, but without much hope, for the straw (in the form of a prospective purchaser) on the waters of disillusion. A good many of them, despite three years or so of experience, were still novices. To a request for figures of costs and profits many looked puzzled, and one said that he didn't count the eggs but that he got quite a lot!

Doubtless there were exceptions, but in general these people, who mostly were men who had fought in the last war and had sought an honest living, wanted more than anything else in the world to get out of poultry farming.

There will be many demobilised men who have what Mr. Alan Thompson, the editor of a recent book[2] on the subject, calls "the urge for an open-air life and believe that hens provide the quickest return with the lowest capital outlay and the smallest experience of any farm enterprise," which urge is doubtless what those disillusioned Sussex farmers had.

Newcomers in the field will, however, have the ad-

vantage of the opportunity of getting the " low-down " on the whole business by reading this book.

The first chapter is written by the editor and has the all-important heading, " Will it Pay?" It contains, in common with the first part of this review, some " lugubrious warnings," but finishes with a quotation from a Mr. George Henderson, who " started a profitable general farm on £150." Somewhat didactically he advises the novice to " ignore the gloomy predictions of those who have looked upon the grapes which are sour. Given the will to *work*, to learn and to *think*, there is hardly anything that cannot be accomplished."

However, the book gives more realistic advice and should be useful to prospective poultry farmers.

* * *

At first sight, some people might look askance at a book on such a subject as gardening written by an amateur, but as it is an art as well as a science which most of us have tackled at some time or another, it may be that the amateur realises those particular doubts and difficulties which the professional might consider unworthy of mention.

Whether this is true or not, Mr. A. J. Simons, a self-confessed amateur, has produced two very clearly written little volumes,[3] which approach the subject in a different way from the usual gardening textbooks, and during reading the impression of having " a jolly good talk " by the side of the allotment is gained. The author is not so much of an amateur as he claims, as he deftly combines practice with theory.

One of the things that has puzzled us is the amazing difference of opinion between gardeners. Having listened respectfully to one expert, we have had our morale considerably shaken by hearing from another that the first gentleman's theories are all wrong. Mr. Simons has evidently had the same experience, but says: "I am quite prepared to admit that I am sometimes wrong and still more ready to agree that my experiences are not necessarily those of others." His explanation of this is: " One of the great attractions of gardening is that there are exceptions to every rule, and the only type of fellow gardener that I cannot tolerate is the confirmed dogmatist who spoils a horticultural meeting by jumping up on every possible occasion with his 'That's wrong' and 'I don't agree.' "

The first volume deals with the general principles of cultivation which apply to the growing of all kinds of vegetables. The second deals with the different vegetables and their own little peculiarities. The author states that the notes are not " the usual complete tabloid guides to the cultivation of each vegetable, but deal with those aspects of cultivation which are not covered by the general rules."

Particular attention has been paid to the forcing, harvesting, and storing of vegetables.

An earnest study of the two volumes should not only enable the neophyte to Dig for Peace successfully, but to face the austere eye of the professional with something akin to confidence.

T. C-W.

[1] *Basic English Fare*. By Andre L. Simon. Pp. 104. 5s.
[2] *Poultry Farming*. Edited by Alan Thompson. Pp. 192. 9d.
[3] *The Vegetable Grower's Handbook*. By Arthur J. Simons. Two volumes. Pp. 224 in each. 9d. each.

Vital Forces

THE main thesis of a curious book[1] recently published seems to revolve around " artificial vitalisation to maintain chemical activity or life force in food ": calcium and magnesium salts are more or less de-energised in some parts of the earth, but elsewhere are surcharged with atomic energy. Food value " is represented by the capacity for latent chemical activity in the atomic content of the edible material." There are several tables giving figures to show the superiority of products made with vitalised liquid, but no real evidence; nor could I find how the vitalisation is performed, except that it is somehow related to artificial solar energy-tension added to water.

The author adduces various physical phenomena with the idea, apparently, of showing that orthodox science has a mystical aspect. He devotes a good deal of space to discussing photosynthesis; and thereby leads me to mention a really intriguing puzzle arising out of recent orthodox work.

If we put R to represent the non-carbon part of the compound formed by photosynthesis, the equation $CO_2 + R = CR + O_2$ does not represent the whole reaction, even when energy quanta are added. Though oxygen is given off during photosynthesis, the evolved oxygen does not come from the carbon dioxide taken in, but from water. The photosynthetic reaction is therefore more truly $CO_2 + 2H_2O^* + R = CO_2.RH_4 + O^*_2$, the water-oxygen being marked with a star to indicate its difference from the oxygen in the absorbed CO_2.

This fact has been discovered owing to the fact that the oxygen in water is really slightly different from oxygen in atmospheric carbon dioxide: the two kinds of oxygen being marked or branded by possessing differing amounts of oxygen isotope O^{18}, which has the atomic weight 18 instead of the usual 16. Isotopic analysis has made it possible to show that the oxygen of air does not come from available CO_2. But, in so doing, it has propounded fresh riddles. M. D. Kamen and H. A. Barker (*Proc. Natl. Acad. Sci. Washington*, vol. 31, 1945, pp. 8-15) have suggested that the explanation will have to be sought in isotope exchange reactions between molecular oxygen and water or other oxygen-containing compounds. As Humpty-Dumpty might say, "There's impenetrability for you!" Unexplained facts about the distribution of the various oxygens in the world offer an untouched field to vitalistic speculators.

The " dark photosynthetic " reaction, whereby CO_2 is reduced to COOH, is performed by all cells throughout the bodies of animals, plants, and micro-organisms, and is independent of light. The ability to reduce CO_2 to COOH thus appears to be one of the fundamental characteristics of living matter. The further true photosynthesis whereby -COOH is reduced, the carbon built up into complex compounds, and oxygen is liberated, can be performed only by the green parts of plants under the influence of light. These considerations, and others concerned with the geochemistry of carbon dioxide, suggest a revision of some ideas about the origin of life. It may not be true that the appearance of life had to await the existence of " free " oxygen; life seems to be a matter of reduction rather than oxidation; and the available evidence

[1] *Vitalisation of Liquid Suspensions*. Charles Reid, A.M.I.Mech.E. Pp. 100. London. 12s. 6d. net.

is not inconsistent with the idea of a biological origin for the oxygen in the atmosphere.

A set of facts having possibly more practical importance has been revealed by the work of E. Bachrach (*Arch. Sci. Phys. Nat.*, vol. 26, 1944, pp. 87-100; *ibid.*, vol. 25 suppl., 1943, pp. 223-227) on the distribution of mineral elements such as potassium and calcium in the ash of plants grown in regions of different temperatures. Yeast grown at high temperature was rich in K, and that grown at low temperatures was rich in Ca. In plants (fruits) those grown in a hot climate were much richer in K, Ca, Mg, and total ash than were those from a temperate climate. In general, the hotter the climate of growth the greater the content of total ash, and of potassium particularly. These facts suggest that the country of origin of our food may not be a matter of indifference.

HUGH NICOL.

Microbiological Assay Methods

THE vitamin B complex is composed of the following substances: Vitamin B_1 (aneurine), vitamin B_2 (riboflavin), nicotinic acid or nicotinamide, vitamin B_6 (pyridoxine), pyridoxal, pyridoxamine, pantothenic acid, biotin, inositol, and *p*-aminobenzoic acid. The constitutions of all these substances are known and had been confirmed by synthesis. There are, however, a number of bodies which have been provisionally assigned to the vitamin B complex, such as folic acid, vitamin B_c, vitamin B_{10}, and vitamin B_{11}, of which the constitutions have yet to be determined.

Under the new labelling order of the Ministry of Food (S.R. & O., 1944, No. 738), food manufacturers must now disclose the amounts of aneurine, riboflavin and nicotinic acid in their products. With the exception of aneurine, the remaining members of the vitamin B complex are difficult to estimate by chemical means, and biological methods are time-consuming and expensive. Within recent years, however, microbiological methods of assay have been used for riboflavin and nicotinic acid, and these methods have been extended still further to other members of the vitamin B complex as well as for the determination of certain amino-acids.

These microbiological methods are relatively expeditious and inexpensive to carry out, and if experimental conditions are kept rigidly constant give reliable results.

The chief organisms used for the assay of the vitamin B complex are to be found among the lactic bacteria. Thus *Lactobacillus helveticus* can be used for the assay of riboflavin and *Lactobacillus arabinosus* for the assay of nicotinic acid. By suitable readjustments of the medium, *L. arabinosus* can also be used for the assay of pantothenic acid and biotin. Aneurine can also be estimated microbiologically by means of the soil organism *Lactobacillus fermentum* 36. This method of microbiological assay of aneurine is particularly valuable in cases in which the chemical method of estimation (thiochrome method) does not give reliable results—*e.g.*, with rye.

The only vitamin of the B-complex which cannot be estimated by means of the lactic bacteria is vitamin B_6 or pyridoxine. The reason is that these organisms respond to a far greater degree to the two newly discovered vitamins pyridoxal and pyridoxamine, and both these substances chemically speaking are very closely related to pyridoxine. For the microbiological assay of pyridoxine it is necessary to use a special X-ray mutant of the fungus *Neurospora sitophila* No. 299.

Not only can the lactic bacteria be used for the quantitative determination of the vitamin of the B-complex, but they can also be used for the estimation of a number of amino-acids, including all the so-called "essential" amino-acids. The various methods for the estimation of the amino-acids by chemical means are, without exception, manipulatively difficult, time-consuming, and require skill and long practice. Microbiological methods, on the other hand, can give results within three days with a high degree of accuracy.

There are two organisms among the lactic bacteria which can be used for the quantitative determination of potassium—namely, *Lactobacillus helveticus* and *Streptococcus faecalis R*. In actual practice it is better to use *Str. faecalis*, because this organism is unique among the lactic bacteria, inasmuch as it requires only one mineral element, potassium, in the medium for normal growth.

These microbiological assay methods yield reliable and reproducible results and need no special or expensive apparatus. A number of samples can be dealt with at any one time.

Summary of a lecture delivered on May 16, 1945, to the London and South-Eastern Counties Section, Royal Institute of Chemistry, by E. C. Barton-Wright, D.Sc., F.R.I.C.

Master Bakers' War Job

TO THE EDITOR OF FOOD MANUFACTURE

DEAR SIR,—London was in the firing line from August, 1940, until May, 1945, and was subject to strain unequalled by any city in the world. But she carried on—her citizens were fed—and London's Master Bakers did a magnificent job.

Our gratitude and pride in that section of industry with which we are so closely associated is real and sincere, *but* all of us want to express it with realism. The active London baker did his job and asked nothing in return. But to support that charity in which he takes such a pride will give that appreciation which we are all desirous of expressing, and by the extent of your generosity those inmates of the almshouses in Lea Bridge Road, Leyton, and the many out-pensioners receiving benefits from the institution, will derive additional comfort to compensate them for the ordeal through which they have passed. It will fill their hearts with pride that in their day they were members of a trade that did its duty in the hour of peril, and still fosters benevolence in the hour of need.

As President of Appeal for 1945, I want to give that lead for this expression of our gratitude, and I feel it could not take a more tangible form than to give, and to give *most* generously, a donation to the London Master Bakers' Benevolent Institution.

My sincere thanks are due to you and my many friends who I know will help me in this endeavour.

Yours sincerely,

J. VALENTINE BACKES,
President of Appeal.

63-69, *Llewellyn Street, S.E.* 16.

Three types of dried potatoes: potato strips, mashed potato powder, and riced potato.

The Drying of Potatoes

Part II

H. G. WAGER, R. G. TOMKINS, S. T. P. BRIGHTWELL, R. J. L. ALLEN and L. W. MAPSON

SCALDING THE STRIPS

(Continued)

Retention of Ascorbic Acid and Aneurin during Scalding

DURING scalding there was a loss from the strips of ascorbic acid and aneurin. The proportion of ascorbic acid leached out of the strips depended partly on the ratio of the weights of potato to scald liquor and partly on the duration of the scald, since equilibrium between the potato strips and the scalding liquor was not attained during water-scalding. For instance, when the ratio of weight of potato strips to weight of scalding liquor at the end of scalding was about unity, the concentration of ascorbic acid in the liquor was 25-50 per cent. of the content in the strips. In steam-scalding the leaching losses depended on the volume of the condensate dripping from the strips.

The proportion of the ascorbic acid initially present in the raw strips which was found in the scalded material and in the scalding liquor is shown in Tables 3 and 4. Table 3 contains averages of all the available data and Table 4 the averages of all the values of certain selected groups of results in which a comparison of the effect of different treatments on samples from the same batch of raw strip was possible. The retention of ascorbic acid during scalding varied greatly, as

TABLE 3

RETENTION OF ASCORBIC ACID DURING SCALDING AND DRYING: AVERAGE AND RANGE FOR ALL DETERMINATIONS

Ascorbic acid as a percentage of that in an equivalent weight of raw washed strips

Treatment.	*No. of Stocks Tested.*	*Scalded Strips.*		*Scalding Liquor.*		*Dry Strips.*	
		Average.	*Range.*	*Average.*	*Range.*	*Average.*	*Range.*
Scalded in water	5	58	(45-80)	21*	(19-24)	42	(26-61)
Scalded in 0·025% Na_2SO_3 solution	35	65	(51-84)	21*	(12-37)	54	(38-74)
Scalded in steam	1	85		—		75	
Dipped in 0·15% Na_2SO_3 and scalded in steam	16	85	(67-100)	—		71	(54-98)
Fully cooked in water, mashed and riced	7	79	(60-99)	—		62	(44-75)
Fully cooked in 0·025% Na_2SO_3 solution, mashed and riced ..	8	87	(66-100)	—		63	(48-80)
Dried raw	6	—		—		66	(47-80)

* The ratio of weight of potato to weight of water was initially 1 : 1 or 1 : 1½ and fell to between 1 : ½ and 1 : 1 during scalding.

TABLE 4

RETENTION OF ASCORBIC ACID DURING SCALDING AND DRYING: AVERAGE AND RANGE OF ALL COMPARISONS OF DIFFERENT TREATMENTS ON SIMILAR RAW MATERIAL

Ascorbic acid as a percentage of that in an equivalent weight of raw washed strips

Treatment.	*No. of Stocks Tested.*	*Scalded Strips*		*Dried Strips*	
		Average.	*Range.*	*Average.*	*Range.*
A. Dried raw (no sulphite)	4	—		63	(47-84)
Scalded in 0·025% Na_2SO_3 soln.		—		53	(33-71)
B. Scalded in water	6	58	(45-80)	42	(26-61)
Scalded in 0·025% Na_2SO_3 soln.		63	(61-69)	51	(33-67)
C. Scalded in 0·025% Na_2SO_3 soln.	16	66	(51-78)	57	(38-76)
Dipped in 0·15% Na_2SO_3 soln. and scalded in steam		85	(67-100)	71	(55-98)
D. Scalded in 0·025% Na_2SO_3 soln	8	67	(59-76)	52	(38-71)
Dipped in 0·15% Na_2SO_3 soln. and scalded in steam		85	(67-100)	64	(54-88)
Fully cooked in water, mashed and riced		79	(60-99)	62	(44-75)
Fully cooked in 0·025% Na_2SO_3 soln., mashed and riced		87	(66-100)	63	(48-80)

shown by the wide range given with each of the average values. Some of this variation was undoubtedly due to the considerable sampling errors, although all estimations were made on duplicate samples, but the greater part is probably due to biological variation in the raw potato and to uncontrolled small differences in the technique of scalding, such as the degree of stirring, rate of heating, rate of coming to the boil, etc.

In these experiments the average destruction of ascorbic acid during water-scalding potato strips was 15-20 per cent. of that present in the raw washed strips, and leaching losses were on the average a little greater at 21 per cent. Destruction and leaching of ascorbic acid were about the same whether scalding was carried out in water or in weak sodium sulphite solution, the difference of 7 per cent. in the destruction being barely significant. Similarly, the small improvement in average retention of ascorbic acid in potatoes cooked whole in weak sulphite solution, as compared with cooking in water, was again barely significant. In both cases, however, the difference in the average retention between scalding with and without sulphite was in favour of the use of sulphite.

The ascorbic acid content of the drip liquor from steam scalding was not normally determined owing to the possibility of metallic contamination from the scalder. In a few cases determinations were made which indicated a loss by leaching of about 15 per cent. This means that the amount of destruction of ascorbic acid during steam-scalding was low, much less than in water-scalding. This may indicate that a fair proportion of the destruction that occurs during water-scalding takes place in the liquid after leaching. In any case, the final result is that steam-scalded potato had, on the average, about 20 per cent. more ascorbic acid than water-scalded potato.

The loss of ascorbic acid could be decreased by serial scalding (as was suggested for scalding cabbage by Allen *et al.*[18]). In serial scalding the concentration of ascorbic acid in the scalding liquor increases and so the rate of leaching from the potato strip decreases. Examples to show the effectiveness of this technique are given in Table 5. The retention of 85-90 per cent. of ascorbic acid by the scalded material was probably about as high as possible in efficient water-scalding and was similar to the retention after steam-scalding. In the first experiment quoted the concentration of ascorbic

TABLE 5

RETENTION OF ASCORBIC ACID DURING SERIAL SCALDING AND DRYING

Ascorbic acid expressed as the concentration found in the material as analysed and as a percentage of that present in an equivalent weight of raw washed strip

		Raw.	*Scalded Strips.*		*Scalding Liquor.*	*Dried Strips.*	
		mg. per 100 g.	*mg. per 100 g.*	*Percentage.*	*mg. per 100 ml.*	*mg. per 100 g.*	*Percentage.*
A265	A. 1st Scald	16·1	8·2	51	2·0	49	44
	9th ,,		14·5	90	6·2	62	59
	B. 1st Scald	15·6	8·8	56	2·5	59	54
	9th ,,		13·3	85	6·8	73	68
A483	1st Scald	17·5	12·1	69	3·0	36	33
	10th ,,		12·2	70	6·0	42	40
A519	1st Scald	7·0	4·0	57	1·1		—
	5th ,,		5·2	75	1·4		—

A265 A. was scalded in tap water, the others were scalded in 0·025 per cent. Na_2SO_3 solution.

The scalded strips are dried in a hot-air oven.

acid in the scalding liquor increased from a value of 20 per cent. of that in the raw for the first scald to 60 per cent. by the tenth scald. Since the samples for the estimation of ascorbic acid in the liquors were not taken until after the addition of the water required to make good loss due to evaporation during scalding, higher values are not to be expected.

Processing potatoes in the presence of sulphite led to a large loss of aneurin (Table 6). Serial scalding did not lead to any increase in concentration of aneurin either in the scald liquor or in the scalded or scalded-and-dried potato. These results were to be expected in view of the destructive action of sulphite on aneurin.

TABLE 6

THE RETENTION OF ANEURIN DURING SCALDING AND DRYING

	Aneurin as a Percentage of that in an Equivalent Wt. of Raw Strips.	
	Scalded Strips.	*Dried Strips.*
Scalded in water	69	57
Scalded in 0·025% Na_2SO_3 soln.	36	25
Scalded in steam	65	69
Scalded in steam after a dip in 0·15% Na_2SO_3	35	16
Dried raw		58

Comparison of Steam and Water Scalding

Potato strips scalded in steam, when compared with similar strips scalded in water, have a higher content of ascorbic acid, soluble solids, and water and, when they are scalded and dried on the same trays, breakage of strips due to handling is reduced. On the other hand, the raw strips require a more thorough washing if stickiness in the cooked product is to be avoided, the incorporation of sulphite entails an extra stage in processing and the concentration of sulphite in the final product is less easy to control.

DRYING THE SCALDED STRIPS

Duration and Temperature of Drying

The scalded potato strips were dried in a current of hot air. Two patterns of dryers were used. One was an electrically heated cabinet dryer, with a

cross current of air, holding twelve trays about 55×43 cm. in area, which could be loaded up to about 1 kg. per tray—*i.e.*, about 1 lb. per sq. ft. The other dryer was heated by steam coils and the air stream was mainly cross current, but there was always a small flow of air through the trays, and it could be converted to a through current dryer. It contained twenty trays of 32×47 cm. in area, which could be loaded up to 2 kg. per tray—*i.e.*, about 2 lb. per sq. ft. The quality of the product from either dryer was the same.

The time required for drying to a moisture content of 6-8 per cent. varied from 2-8 hours, and was dependent on the temperature, humidity and velocity of the air, the cross-sectional area of the strips, and the loading of the trays. For any given set of conditions, a through-draught dryer tended to be faster than an over-draught one. In normal practice the initial temperature of the incoming air was about 75-80° C., but, owing to evaporation, the temperature of the strips was about that of the wet bulb thermometer. The wet bulb temperature depended on the extent of ventilation of the dryer, and the normal practice was to adjust the ventilation so that the temperature of the wet bulb thermometer did not rise above 35-65° C. These conditions were maintained until the bulk of the water was removed, when the wet bulb temperature fell and that of the strips rose, and, to avoid browning of the strips, the temperature of the incoming air had then to be reduced to about 60-65° C.

The moisture contents of samples are determined. In some instances this is done by means of the M.P.L. moisture meter.

Loss of Sulphite

The concentration of sulphite in the strips rose during drying, but not so fast as was to be expected by the loss in weight. In a series of some forty tests on different stocks of King Edward and Majestic potato processed during January and February, about 40 per cent. of the sulphite present in the scalded strips was lost during drying, as shown by the following average figures. In each case the initial concentration of sodium sulphite in the scalding liquor was 0·025 per cent., the *p*H was about 8·5, falling to between 7·0 and 8·0 during scalding, and the ratio of weight of potato to weight of water was about unity.

Sulphite as p.p.m. SO_2 in scalded strips	35
Sulphite as p.p.m SO_2 in dried strips ..	113
Wt. of scalded strips : Wt. of dried strips	5·5
Content of sulphite in scalded strips : Content of sulphite in dried strips ..	3·2

Figures showing the sulphite content of scalded and dried strips and scalding liquor in relation to the concentration of sulphite in the solution before scalding are set out in Table 2. The average values of the ratio of sulphite in the dry to that in the scalded material clearly indicate that the relative loss is much greater at low contents of sulphite, but the actual loss is greater at high contents; the drying ratio—*i.e.*, ratio of weight of scalded strips to weight of dry strips—for these potatoes averaged about 5·2, thus the loss of sulphite at the lowest concentration was about 70 per cent., whilst at the highest concentration it was only 25 per cent.

Loss of Ascorbic Acid

During the drying the loss of ascorbic acid in potato strips was about 15-20 per cent. (see Tables 3 and 4). This loss is due presumably to oxidation and, by analogy with the work of Allen *et al.* on cabbage, the destruction of ascorbic acid during drying should be decreased by the presence of sulphite. In this group of data there was, however, an average improvement in retention of ascorbic acid during drying strips of potato of only 4 per cent. when sulphite was used in the scalding liquor (Table 4 B), and during the drying of riced potato the retention was greater when sulphite was not used in the cooking liquor (Table 4 D). It therefore appears that the effect of low contents of sulphite in potato strips, on the retention of ascorbic acid during drying, is small.

The Dried Product

Dried potato strips of good quality are white to light yellow in colour and free from greyness; there should be no brownness in any of the strips, as this is a sign of overheating during drying. The strips are brittle when hot or cold. The packing density is about 0·25 g./ml.

The dried strips are cooked by reconstituting in cold water for about 2 hours or in hot water for 1 hour, then bringing to the boil and simmering until tender (from 2-3 minutes up to 10 minutes). The cooked strips should resemble cooked fresh potato in colour and should not be grey or brown. They should have a uniform potato-like texture throughout—*i.e.*, the centre of the strips should be as soft as the peripheral portions—and the flavour should be similar to, but usually weaker than, fresh potato.

The rate and degree of reconstitution was conditioned principally by the thickness of the piece dried. Strips $\frac{1}{16}$ in. square or less readily took up as much water as they had lost, but as the cross-sectional area was increased the rate of uptake of water and the equilibrium amount absorbed progressively decreased and the strips remained tough after cooking, or at least had a tough core. The optimum thickness of strip is probably between $\frac{1}{16}$ in. and $\frac{1}{8}$ in. in the thinnest dimension.

Culinary quality

It is usually impossible to say from the flavour and appearance of cooked strips whether they had been dried after steam- or after water-scalding. If, however, two samples of the same batch of raw strips are dried, one after steam-scalding, the other after water-scalding, it is often possible to observe a slight textural difference, the steam-scalded strips being slightly more waxy than the water-scalded.

Strips dried raw without the use of sulphite are of a very poor colour, due to enzymic darkening, the extent of darkening depending, among other things, on the stock of potatoes, the season of the year and the rate of drying; rapid drying produces a better product. Potato strips dried raw after dipping in a fairly concentrated solution of sodium sulphite or metabisulphite are of similar colour to scalded and dried strips, as shown by the following figures:

	Colour.	*Flavour.*	*Texture.*
Strips dried raw after dipping in 0·5 per cent. Na_2SO_3 ..	2·0	2·1	2·4
Strips scalded in 0·025 per cent. Na_2SO_3 ..	2·1	2·5	3·0

The figures quoted for texture are the average of the marks awarded by a panel of not less than six tasters, the scale of marking being 4 = excellent, 3 = good, 2 = fair, 1 = poor.

The texture of strips dried raw is not so good as scalded and dried potato and may be poor; also the cooking time is very long. The flavour is that of raw potato and never becomes similar to cooked potato however long cooking is continued. The appearance of the cooked product is also poor, as the cooked strips are somewhat translucent and look sodden.

Ascorbic Acid in the Dried Strips

The concentration of ascorbic acid in raw potato is high at the time of maturity and thereafter falls, at first rather rapidly, and then more slowly until the end of storage (*cf.* Smith and Paterson,[17] Smith and Gillies,[16] and Zilva and Barker[18]). The concentration of ascorbic acid in the dried strip varied in a similar way; strips dried in September and early October contained 50 to 90 mg. per 100 g. of ascorbic acid, but by the end of the winter values of 12 to 16 mg. were typical.

Immature potatoes and freshly dug early potatoes, like freshly dug maincrop potatoes, have a high ascorbic acid content, and strips prepared from them had a concentration of ascorbic acid ranging from 50 to 90 mg. per 100 g. dry.

The effect of the method of processing on the retention of ascorbic acid by dried potato strips is shown in Tables 3 and 4. Strips dried raw were fairly high in ascorbic acid, but this was outweighed by their low culinary quality. There was a greater retention of ascorbic acid by dried potato strips which had been scalded in steam than by strips from the same stock scalded in water.

In six separate experiments the use of sulphite in scalding potato strips in water led to an average increased retention of ascorbic acid of 10 per cent. The range in the percentage of ascorbic acid retained by dried strips was so large that the significance of a 10 per cent. difference of the average was doubtful, but five of the six comparisons were in favour of the use of sulphite and the sixth was only slightly unfavourable. In making riced potato the retention of ascorbic acid was unaffected by the use of sulphite (average of eight determinations). Thus it seems justifiable to conclude that the use of sulphite causes in general only a slight average improvement in the retention of ascorbic acid by dried potato.

Serial scalding led to a greater retention of ascorbic acid in the scalded strips, and the dried product shows the same result (Table 5).

NOTE.—The references in the text will be published at the end of this series.

(To be continued)

BOOKS RECEIVED

National Institute for Research in Dairying. Report for the three years, 1941, 1942, 1943.

Nutrition and Relief Work. Council of British Societies for Relief Abroad.

Ministry of Food

Latest Statutory Rules and Orders

The list given below is the continuation of the list of Orders published in *Food Manufacture*, May 1, 1945, page 174.

No.	Date. 1945.	
		PRICE FIXATION ORDERS
5	Jan. 1.	Oat Products (Control and Maximum Prices) Order. Revokes S.R. & O. 1940 No. 2130; 1941 Nos. 30, 100, 362 and 524; 1942 Nos. 977 and 1371; and 1943 No. 1191.
8	,, 2.	Order amending the Home-Grown Onions (Maximum Prices) Order, 1944.
47	,, 18.	Order amending various Orders (Control and Prices) (Great Britain) and also (Control and Prices) (Northern Ireland) 1942, 1943 and 1944 in respect of Barley, Beans, Dredge Corn, Oats, Peas and Rye.
100	,, 25.	Order amending the Nuts (Control and Maximum Prices) Order, 1942, and the Dried Fruits (Control and Maximum Prices) Order, 1943.
109	,, 27.	Order amending the Meat Products, Canned Soup and Canned Meat (Control and Maximum Prices) Order, 1944, and the Low Fat Soya Products (Control and Prices) Order, 1943.
		FEEDING STUFFS
1	Jan. 1.	Flour (Feeding Stuffs) Order. Revokes S.R. & O. 1944 Nos. 1, 1088 and 1436.
		FISH
60	Jan. 22.	Order revoking the Fish Box (Returns) Order, 1943. See Wheat Gluten.
		KITCHEN WASTE
48/S2	Jan. 3.	(Licensing of Private Collectors) (Scotland) Order.
		POINTS RATIONING
7	Jan. 2.	Order amending the Food (Points Rationing) Order, 1944.
		POTATOES
27	Jan. 12.	Order amending the Potatoes (1944 Crop) (No. 2) Order, 1944.
49	,, 19.	Order amending the General Licence, December 15, 1944, under the Potatoes (General Provisions) Order, 1944, and the Potatoes (1944 Crop) (No. 2) Order, 1944.
		PRESERVES
66	Jan. 23.	Order amending the Preserves Order, 1944.

No.	Date. 1944.	
		RATIONING
1339	Dec. 1.	Order amending the Directions, October 23, 1943, Supplementary to the Feeding Stuffs (Rationing) Order, 1943.
1355	,, 6.	(General Provisions, Tea and Personal Points Foods) Order amending the Food Rationing Orders, 1944.
1357	,, 6.	Directions (Fats, Meat, Cheese, Sugar and Personal Points. Christmas—extra rations.)
1359	S66 7.	Directions (Fats, Meat, Cheese, Sugar and Personal Points. New Year—extra rations, Scotland.)
1406	,, 15.	Order revoking the Rationed Foods (Emergency Retail Stocks) Order, 1942. Revokes S.R. & O. 1942 No. 1500.
1409	,, 16.	Order amending the Food Rationing (General Provisions) Order, 1944.
		RESTAURANTS
1277	Nov. 14.	Directions, 1944, under the Meals in Establishments Order, 1942.
		TRANSPORT AND TRANSPORT (SECTOR SCHEME)
1198	Oct. 21.	Order amending the Food (Sector Scheme) Order, 1943. (Nuts.)
1230	,, 30.	Seed Potatoes (1944 Crop) Transport Order.
1234	,, 31.	White Fish Transport Order. Revokes S.R. & O. 1943 No. 547.
1301	Nov. 21.	Order amending the Seed Potatoes (1944 Crop) Transport Order, 1944.
		TURKEYS
1197	Oct. 21.	Stock Turkeys (Control of Sales in November) Order.
	1945.	VEGETABLES
28	Jan. 12.	Order amending the Carrots (General Provisions) Order, 1944.
		WHEAT GLUTEN
60	Jan. 22.	Order revoking the Wheat Gluten (Licensing of Manufacturers) Order, 1942, the Acquisition of Food (Excessive Quantities) Order, 1942, and the Fish Boxes (Returns) Order, 1943. Revokes S.R. & O. 1942 Nos. 350, 525 and 1837; and 1943 No. 695.

Changes in Ice Cream Formulæ

SPECIALLY CONTRIBUTED

THE reduction of the allocation of fat to ice cream manufacturers by 10 per cent. of the datum usage (12½ per cent. of the actual allocation), and the total suspension of the allocation of skimmed milk powder at the end of the 8-week period on July 21, caused manufacturers of every category and without exception to revise their formulæ.

Nor can any guarantee be given that these cuts will be the only changes necessary in the allocations of ingredients as a result of the worsening of the world food position. The sugar situation hangs by a thread. Colonel Llewellin has admitted that his main anxiety was that world estimates of sugar supplies for the remainder of 1945 might not fully materialise, and that if any reduction were necessary in the releases to British consumers, food manufacturers would be the first category affected.

Sugar, Skimmed Milk Powder, and Fat Supplies

Meanwhile, the sugar allocation to ice cream manufacturers remains unchanged at 60 per cent. of datum usage.* In view of the Minister's warning, some manufacturers have reduced the sugar content of their mixes. The author is strongly of opinion that this is a mistake and is contrary to the interests not only of those firms individually but also of the trade as a whole. Palatability is the main selling point of ice cream, and sweetness is one of the essentials in bringing out the flavour of the product. Manufacturers have already, in most cases, reduced the sugar content of their mixes from the pre-war level of 13·5 per cent. to 10 or 11 per cent. Any reduction below 10 per cent is very undesirable.

The gallonage of ice cream that a manufacturer can produce is probably governed more by sugar supplies than by any other single ingredient. The present allocation of 60 per cent. of datum usage, together with the reduction in the sugar content of mixes compared with pre-war formulæ, enables a manufacturer to produce about 80 per cent. of his datum gallonage of ice cream.

No manufacturer who values his reputation will allow himself to be tempted by the present boom in ice cream sales to stretch his ingredients to such limits that only an inferior product can be made. Reputable manufacturers will not reduce the sweetness of their mixes, but will share the former Minister's anxiety and will carry on in the hope that the present allocation of sugar will be maintained.

The release of skimmed milk powder to the industry ceased on July 21. When the stoppage of supplies was announced, the Ministry advised ice cream manufacturers not to use up the whole of their final allocation during the eight weeks, but to divide it into four parts to be used during four successive allocation periods. The trade took this advice to be a very broad hint that no resumption of allocations of skimmed milk powder, or releases of any other form of milk to the trade, could be expected during the whole of those periods.

That advice has been acted upon by a large proportion of manufacturers, with the result that the majority of firms will be able to use a certain amount of skimmed milk powder in their mixes until the end of the year at the earliest. It is not possible to forecast when a resumption of allocation will be possible.

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The reduction of 10 per cent. in the datum fat allocation (12½ per cent. actual), unfortunate as it is, is much less serious than the suspension of milk powder releases. Firms who were in receipt of an allocation of fat based on 80 per cent. of their datum usage are still able to make a mix of reasonably good fat content.

The question confronting every manufacturer is how can the loss of fat and of skimmed milk powder best be made good? The ingredients that have been lost are two of the most valuable from the nutritional standpoint, as well as from the point of view of palatability. It is very desirable to study both these points in the quest of "fillers." A certain amount of fat can be obtained by using soya flour and dried whole egg. The latter product can now be used by ice cream manufacturers only under a licence issued by the Ministry of Food, and it is a condition of the licence that the dried egg must be used only in a hot process mix. The licences are obtainable from the Ministry's Oils and Fats Distribution Officers. The reason for the introduction of these licences is that the supplies of dried egg now available are of high bacterial count.

Wheat and Soya Flour

Wheat flour and soya flour must be relied upon to make good the loss of milk solids due to the drastic cut in the amount of skimmed milk powder used. When wheat flour mixes were used in 1941 and 1942, it was customary to use malt extract as an ingredient. It is not being widely used at the present time, but malted flour is largely used. Glycerin monostearate, at the rate of 1 oz. to the gallon of mix, is a very useful emulsifying ingredient. Salt is also a useful addition to all mixes containing wheat flour.

Gelatine is not satisfactory in the new mixes as, when wheat flour is used, a poor overrun results. Manucol will enable a more normal swell to be obtained. A satisfactory alternative is Irish moss (Gelozone).

Now for actual formulæ. While the allocation of fat was at 80 per cent. a number of manufacturers used only five ingredients (apart from water); others used soya flour in addition. Table 1 shows two typical examples, one containing 12 per cent. and the other 10 per cent. fat.

TABLE 1

	12 *per cent. Fat Content.*	10 *per cent. Fat Content.*
Margarine	14·25 lb.	12·00 lb.
Sugar	11·00 lb.	11·00 lb.
Skim milk powder ..	11·00 lb.	11·00 lb.
Soya flour	0·00 lb.	2·00 lb.
Gelatine	0·50 lb.	0·50 lb.
Water	6¼ gals.	6¼ gals.
	100·00 lb.	100·00 lb.
Total solids ..	36·75 %	36·50 %

With the reduced allocation of margarine, the fat contents of the above formulæ have to be cut to 10·5 per cent. and 8·75 per cent. respectively; the changes necessitated by the drastic reduction in skimmed milk powder are less easily adjusted. Practical revised formulæ are given in Table 2.

TABLE 2

	10·5 *per cent. Fat Content.*	8·75 *per cent. Fat Content.*
Margarine ..	12·50 lb.	10·50 lb.
Sugar	11·00 lb.	11·00 lb.
Skim milk powder	2·75 lb.	2·75 lb.
Soya flour ..	4·00 lb.	4·00 lb.
Wheat flour ..	4·00 lb.	6·00 lb.
Glycerin monostearate ..	0·50 lb.	0·50 lb.
Manucol	0·25 lb.	0·25 lb.
Dried whole egg ..	1·00 lb.	1·00 lb.
Salt	·125 lb.	·125 lb.
Water	6·4 gals.	6·4 gals.
Total solids ..	36 %	36 %

The new formulæ are obviously more troublesome to the manufacturer, if only by reason of the fact that he has twice as many ingredients to look after. Few manufacturers like to exceed 4 per cent. soya flour because of its pronounced flavour, and also because an excessive quantity might give too strong a colour to the finished product. In any case, the revised formulæ are almost sure to require twice as much flavouring as the original ones in order to give maximum camouflage to the soya and wheat flours.

Dried Whole Egg

Dried whole egg is a desirable though not an essential ingredient. The quantity can be increased to 2 lb. in each case if desired, and the quantity of wheat flour reduced by 1 lb. It will be necessary, however, to process the dried egg in accordance with the terms of the Ministry of Food licence, which are as follows:

When the egg has been mixed in such a manner that it is no longer a dry powder, then:

(*a*) The product shall not be kept for more than one hour at any temperature between 45° F. and 150° F. before being subjected to heat treatment in accordance with the following sub-paragraph.

(*b*) The product shall be subjected to a temperature of not less than 150° F. for 30 minutes or alternatively to a temperature of not less than 160° F. for ten minutes.

After the product has been subjected to heat-treatment as provided in (*b*) above, it shall be reduced to a temperature of not more than 45° F. within 1½ hours, and shall be kept at such a temperature until it is frozen in the course of manufacture of the ice cream.

The terms of the licence mean, shortly, that the mix must be efficiently pasteurised. The time-temperature ratios correspond more or less to those of the "holder" and high-temperature short-time pas-

teurisation processes for milk. The terms do not involve any alteration in the method of processing the mix except, possibly, to extend the time for which some manufacturers might hold it at pasteurisation temperature.

Processing Methods

In processing, the wheat flour is mixed with nearly all the cold water to form a perfectly smooth mixture, the balance of the water being used to dissolve the Manucol overnight. The flour mixture is then heated to 150° F., at which temperature the other dry ingredients (*i.e.*, all except the margarine and the glycerin monostearate) are added after having been thoroughly mixed. Hold at that temperature for 30 minutes, or at 160° F. for 10 minutes. Then, at 160° F., add the margarine (in small pieces) and the glycerin monostearate. Some manufacturers prefer to melt the fat separately and add it in liquid condition at that temperature. The stabiliser should be added at the end of the holding period.

After the fat has been added, stir the mix vigorously and put through the homogeniser or emulsifier, cool, add flavouring, and freeze.

Ice Cream Standards

Recently the first definite steps towards a standard for ice cream have been taken. At the invitation of the Ministry of Food, representatives of the two trade organisations, the Wholesale Ice Cream Federation and the Ice Cream Alliance, met officials of the Department in London, and at the conclusion of the discussion the Ministry's representatives asked the trade organisations to prepare proposals for a statutory standard for ice cream to be put into operation when all ingredients are free from restriction.

The request for a standard is understood to have originated within the trade. The procedure to be followed will be similar to that taken in regard to other products to which standards have been applied under Ministry of Food orders. The two trade organisations are expected to appoint a joint committee which will endeavour to reach agreement on a standard. When this has been done, and the two organisations have approved the proposal, it will go forward as an agreed recommendation from the trade to the Inter-departmental Committee on Food Standards—a Government body on which the Ministry of Food, the Ministry of Health, the Board of Trade and other Departments are represented.

Any revisions that this Committee may suggest will be referred back to the trade organisations, and the standard finally agreed upon will presumably be brought into operation at the first suitable opportunity after all ingredients used in ice cream manufacture are free from restrictions. That time is not expected to arrive before 1948 or 1949.

Should the trade organisations fail to agree on a standard, or should they fail to reach agreement with the Inter-departmental Committee, the Committee may endeavour to frame a standard that they can recommend to the appropriate Minister. Failure of the trade to reach agreement on a standard may therefore result in the Government enforcing a standard that no section of the industry would desire.

At the time of going to press, the Ministry of Food has announced that the sugar allocation was to be reduced to 40 per cent. of datum usage from September 16.

Salad Cream and Mayonnaise

THE following is a *précis* of a report by the Inter-Departmental Committee on Food Standards :

1. The Committee have received a memorandum from the Fruit and Vegetable Products Division stating that the Pickles and Sauces Committee of the Food Manufacturers' Federation would welcome a statutory standard for salad cream and mayonnaise. The request was supported by the Division on the ground that a standard would ensure that when the public buy a garnish for use on salad by either of these descriptions the product supplied would be of the nature required.

2. The following standard was proposed by the Pickles and Sauces Committee of the Food Manufacturers' Federation :

> Salad cream and mayonnaise to be a semi-solid emulsion containing edible vegetable oil, sugar, egg, and other ingredients, the content by weight to be not less than 25 per cent. of edible vegetable oil and not less than 2 per cent. egg solids.

3. From the information supplied by the Division and by the trade representatives the following conclusions were drawn :

(i) The name "salad cream" was coined in the 1920's to describe a new type of garnish then being introduced. This product was a smooth, non-separable vegetable in oil emulsion differing from other dressings on the market in having a lower acidity and sweeter taste.

(ii) Products described as "mayonnaise" are essentially similar to those described as "salad cream," but are usually more viscous.

(iii) Before the war preparations containing no oil had almost entirely disappeared from the market. As a result of the shortage of suitable vegetable oils during the war, non-oily dressings have again been introduced. Manufacturers of products containing oil consider that non-oily dressings should not be described either as "salad cream" or as "mayonnaise."

(iv) The proportion of oil contained in salad cream or mayonnaise before the war was from 25 to 48 per cent., or, exceptionally, up to 50 per cent.

(v) The oil used in salad cream is of vegetable origin, and it is improbable that any manufacturer would wish to use animal fats instead. Margarine, even if available, would be too expensive and hardened whale oil is unsuitable.

(vi) Salad cream and mayonnaise usually contain sugar, but unsweetened products are also available on the market.

4. The Committee were informed that the name "salad cream" has from its introduction until recent months been used only for products containing oil, and that "mayonnaise" also has always contained oil. They agree with the view that the purchaser of a salad garnish is entitled to know from the description under which it is sold whether or not oil is one of the major constituents, and consider that these names should be reserved for products containing oil in adequate amount, leaving the name "salad dressing" or any alternative name sufficiently dissimilar to salad cream or mayonnaise to describe a garnish containing little or no oil.

5. The Committee note that the manufacturers' suggestion as to the minimum proportion of oil—viz., 25 per cent. by weight—is the lowest proportion that was found in pre-war products. Since edible vegetable oil is in restricted supply the inclusion in the standard of a higher minimum proportion would result in an undesirable reduction in output and the Committee are satisfied that the proposed figure is reasonable, at least in present circumstances.

6. The inclusion of a figure for egg solids presents difficulties in regard to enforcement. Lecithin may be added as an emulsifying agent or may be present as a result of the inclusion of soya among the ingredients. The proportion of egg solids calculated from the amount of phosphorus present in organic combination may therefore be appreciably higher than the proportion actually included by the manufacturer. On the other hand the Committee agree with the view expressed by the manufacturers that the public expect salad cream to contain egg, and it is considered that the mere fact that an unscrupulous manufacturer may be able to escape detection is not sufficient justification for omitting from the standard all reference to what is regarded as an essential ingredient.

7. The standard suggested to the Committee included "not less than 2 per cent. of egg solids." On enquiry the Committee was informed by the trade representatives that 2 per cent. of whole egg solids was intended. Further enquiry showed that while whole egg is of necessity the ingredient at present in use, some manufacturers may wish to use yolk only, either liquid or dried, as soon as it becomes available. It is the yolk fraction of whole egg which has the emulsifying and stabilising action, and it also renders the product more palatable. The Committee is therefore of the opinion that it is unnecessary to require that salad cream or mayonnaise should also contain the white, and it is recommended that the standard be prescribed in terms of yolk solids. Manufacturers will then be free to incorporate the yolk in the form of whole egg, whether liquid or dried, if they wish to do so.

8. A content of 2 per cent. of whole egg solids corresponds to about 7·5 per cent. of liquid whole egg. The Committee regard this proportion as being reasonable, particularly in present circumstances. The corresponding proportion of egg yolk solids is 1·35 per cent., and this is therefore the minimum standard proposed.

9. The standard submitted to the Committee included a reference to the presence of sugar, but did not specify the proportion. It is understood that manufacturers of salad cream and mayonnaise are not unanimous as to the desirability of including sugar in their products, and as the Committee do not regard sugar as an essential ingredient it is considered that no reference to it shall be made in the standard.

10. If an Order prescribing a standard for salad cream and mayonnaise is made under the Defence (Sale of Food) Regulations, 1943, the effect of the Food Standards (General Provisions) Order, 1944, as amended, would be to apply the standard also to products sold under such descriptions as to lead an intending purchaser to believe he is purchasing salad cream and mayonnaise. It is suggested that consideration should be given to the question whether the descriptions "salad dressing" and "salad sauce" might lead a purchaser to believe he is purchasing a preparation conforming to the standard. If there is any doubt on the matter the Order creating the standard should make it clear that it does not apply to a product sold under these descriptions.

11. The Committee accordingly recommended that:

(i) Salad cream and mayonnaise should be required to contain not less than 25 per cent. by weight of edible vegetable oil and not less than 1·35 per cent. by weight of egg yolk solids.

(ii) The standard should not apply to a product sold under the description "salad dressing" or "salad sauce," and if necessary products sold under these descriptions should be specifically excluded from the ambit of the Order creating a standard for salad cream and mayonnaise.

Quick Frozen Herring

A DEMONSTRATION of two methods of "quick" freezing herring, staged at Fraserburgh on August 2 by the Herring Industry Board, gave a clear picture of the way in which the latest scientific knowledge is being applied for the benefit of the herring industry.

Herring are highly perishable, and, even when iced, summer herring cannot arrive at distant markets, such as London and the South of England, in the same condition in which they are landed at ports in the North of Scotland where the summer shoals are located. At other times of the year, notably in March and April, no herring of satisfactory quality are available anywhere around our coasts.

The aim of the Board is to have herring equal in quality to the fish newly landed made available in every fishmonger's shop at all times of the year.

That this can be done has been proved by small-scale experiments conducted by the Ministry of Food in 1944. Quick freezing has been shown to arrest all deterioration, and herring landed in the North of Scotland in June can be sold in London at least six or eight months later, in a condition indistinguishable from that in which they were brought to the quayside.

This year the Herring Industry Board's extensive experiments in the Moray Firth and at Yarmouth, in which they aim to deal with about 3,000 tons of herring, are designed to ascertain the costs of operation and to smooth out the difficulties that inevitably arise when operations are conducted, for the first time, on a commercial scale.

Two different methods are being tried out this year. These are commonly known as the "multiplate" and the "airblast" processes. The former is an American process, of which the patent rights in this country are owned by Frosted Foods, Ltd. The "airblast" pro-

(*Continued on page* 333)

The blancmanges, custard, rice pudding, and cocoa were prepared by the reconstitution of blocks, one of which is also included in the photograph.

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Quick Soluble Milk Blocks

O. de ROUSSET-HALL and M. INGRAM

Low Temperature Research Station.

EVERYONE in the food world will be aware of the stimulating effect that the war-time shortage of shipping has had upon all investigations designed to reduce the weight and bulk of foodstuffs. This has led to the production of a great range of dehydrated foods, though only two of these are familiar to the housewife. As a natural corollary to the development of dehydration has come the compression of the dehydrated foods, to reduce the bulk of the product with, incidentally, a consequent reduction in the proportion of packing materials required. Compression has the additional effect of limiting the access of oxygen to the food, and, as oxidative changes are important causes of spoilage during storage, compression into blocks or tablets has sometimes made possible the use of substitute packing materials in place of the tinplate can.

Compounded Tablets

There is nothing really novel in compounded tablets of dry foods. Soup cubes have been on the market for a long time, but since the development of a wider range of dehydrated foods, a large number of familiar dishes have been made in tablet form. They have proved valuable for special feeding purposes in the Services, and may well have applications in post-war feeding. Other advantages of the tablet include ease of packaging, attractiveness, and the fact that weighing and measuring in the kitchen can be dispensed with. Prior to the development outlined below, the chief disadvantage of tablets, particularly when made from powders consisting of small-sized particles, was that they needed to be crumbled to a powder before use, and this was often difficult and wasteful.

For the special purposes for which these tablets were required in the Services, there was exceptional need for ease and simplicity of preparation, with a premium on what may be called the "normality" of the prepared dish. Few will question that these qualities would also be desirable in post-war prepared foods, both for domestic use and for camping expeditions, walking tours, etc., for which it is an additional advantage if the tablets are good when eaten dry as sweets.

It was obvious that if milk blocks could be produced, a whole range of related products such as milk beverages, milk puddings, and custards would follow. One great advantage of products containing dried milk as the main component would be that they would not only be highly nutritious but would need little or no cooking, so that meals could be prepared very quickly from them. Also, if their tendency to clog the mouth could be overcome, many of them could be eaten in the dry form. Exceptions are those containing raw cereals.

At first the outlook was not very promising, for, even in powder form, full-cream dried milk does not disperse well in water, particularly if it is slightly damp. Lumps have to be broken up with a spoon or fork. Compressed blocks of dried milk-powder had been made in Australia to facilitate shipping, but these were hard and had to be ground in a machine before use.

In the case of compounded tablets containing milk, it is possible to add substances to make the powder easier to handle. As the chief binding factor in the compressed milk tablets is the fat, the addition of extra fat to make the powder bind at a lower pressure was obviously a possibility. A mixture of milk-powder, butterfat, and sugar was compressed successfully in hydraulic presses, giving tablets that could be crumbled by hand to a powder, from which a palatable milk drink was prepared by the addition of either hot or cold water. Cocoa, coffee, tea, custard, and milk-pudding

Filling the wooden moulds with the warm mixture.

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blocks made on similar lines were also quite successful, and had good keeping qualities; although some trouble was experienced, particularly after storage, with the tea and coffee blocks due to interaction of the tannins and the milk powder, resulting in a loss of solubility of the milk proteins. When eaten as sweets the milk and cocoa blocks did not clog the palate like spray-dried milk, although they were still not perfect in this respect.

Difficulties in Manufacture

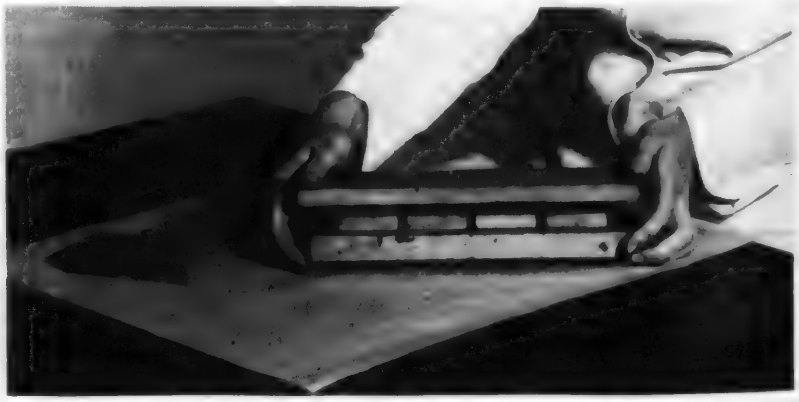
These products had two disadvantages: they required complicated and scarce machinery for their manufacture, and they had still to be crumbled. Lumps that escaped crumbling did not reconstitute and marred the smoothness of the drink. In order to overcome this second trouble, the addition of various wetting agents was tried, without success.

As a new approach to the problem the fat content of the blocks was increased to about 20 per cent., and the extra fat was melted and mixed thoroughly, so that the individual particles of milk-powder were enrobed with a fat layer. As the fat was added molten, the blocks were not compressed but "cast in moulds," so that on cooling a continuous phase of fat cemented the blocks. This was a great advantage, as it dispensed with the need for hydraulic presses altogether and greatly simplified manufacture. The principle is, of course, the same as that used for the manufacture of chocolate bars, except that the hot mixture is not so fluid as chocolate and has to be formed into the moulds or rolled in large slabs and cut.

Blocks prepared in this way do not need to be crumbled before reconstitution. They are broken into pieces of convenient size and stirred into boiling water. As the fat melts the particles of milk powder are released and disperse without formation of lumps. If the block is not broken up, the time needed for dispersion is increased.

This method has some disadvantages: The block cannot be made up with cold water, and the high fat content causes a slight surface-scum to form on the drink as it cools. This is not noticeable if only a little water is added, and thick creams or spreads, prepared from the blocks, are very palatable when cold, though, of course, they have initially to be prepared with hot water. When the block is eaten as a sweet the fat acts as described above and prevents the clogging of the palate.

The fat finally selected and found successful for making blocks to be used in cool temperate climates was refined deodorised cocoa butter. This is colour-



Expressing the blocks from the mould.

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less, odourless, and tasteless; it has a sharp melting point at 30°C., and sets hard so that the blocks do not crumble but snap in the same way as chocolate bars. For blocks to be used in warmer climates, or even in Britain in summer, it is desirable to increase the melting point of the fat. For this, refined hydrogenated palm kernel oils and various mixtures of these and cocoa butter have been tried successfully.

Related Products

In the same way as with the compressed blocks, a wide range of related products has been prepared. The tea and coffee preparations were not successful because of the fat layer on the surface of the drink, but an excellent coffee block for dry eating has been prepared with spray-dried coffee extract, which also makes an excellent coffee filling. Cocoa blocks can be used in the same way as milk blocks. The egg custards at first tended to curdle, but the addition of 5 per cent. of cornflour to the mixture prevented this, and it also absorbed the added fat, so that most people prefer the custard when cold. The high proportion of carbohydrate also served to absorb the added fat when the blancmange and milk-pudding mixtures were made up.

Although the moulded blocks have a lower density and a higher fat content than those made by compression, their keeping properties are satisfactory. Protection against the uptake of moisture is vital, and is afforded by wrappers of high-grade waxed paper. Waxed transparent films are better than waxed straw paper, as they increase the attractiveness of the product and are not stained by the fat (even at 68°F. some staining of a straw-based waxed paper wrapper will take place in time). It is essential to use films if the blocks are being sent to warm climates, as fat-seepage affects the moisture resistance of the wrapper. Also the surface layer of expressed fat oxidises rapidly and the block acquires a rancid flavour. Thus the relative storage life of 2-oz. milk blocks at 97° F. is 4 weeks when wrapped in waxed paper, and from 16 to 32 weeks in waxed film. To date, the longest time for which these moulded milk blocks have been stored at 68°F. is 8 months, their quality being perfectly satisfactory during this period, whether they were wrapped in waxed paper or in waxed film. It should be added that this period is reckoned from the time of manufacture of the blocks, and that the milk powder used was up to 6 months old before it was compounded. The cocoa and coffee preparations have similar keeping properties, while the custard blocks are distinctly superior, having been stored for 8 months at 97°F.

It is not the intention in this article to discuss the potentialities of this type of product in the post-war market, but merely to give an account of technical development in war-time; the omission of any references to the cost of production is also deliberate.

The authors were assisted in this work by Miss A. M. K. Brabant-Smith and Mr. F. A. E. Porter. The work was carried out as part of the programme of the Food Investigation Board, and is published by permission of the Department of Scientific Industrial Research.

Quick Frozen Herring

(*Continued from page* 330)

cess has been developed and perfected largely by experiments conducted at the Torry Research Station of the Department of Scientific Industrial Research, and supported by grants from the Herring Industry Board.

In the case of the " multiplate " freezer, the herrings are made up in packages of convenient size and placed in what looks like a big cupboard with numerous metal shelves. These shelves are, in fact, plates through which circulates liquid ammonia. The plates are brought into close contact with the packages placed between them by light hydraulic pressure, and the herrings are frozen through and through in about an hour.

In the case of the " airblast " process, the herrings are first packed into trays, each containing about 7 lb. of fish in a single layer. Numerous trays are packed on a special truck, which travels slowly through a tunnel against a strong current of extremely cold air. This icy blast freezes the fish through to the centre in less than an hour. On emerging from the tunnel, the under surfaces of the trays are momentarily sprayed with warm water, which releases the block of frozen fish. The blocks are then sprayed with fresh water and again subjected to a cold blast of air, which has the effect of glazing the fish and preventing evaporation. At each plant a low-temperature holding room has been provided for the temporary storage of the frozen herring pending dispatch to permanent cold stores for later release to the trade.

It has been found that herring, if the best results are to be obtained, must be stored at very low temperature. The optimum temperature for storage is 25° below zero F., and at present there are few cold stores in the country able to maintain this. The greater part of this season's output of frozen herring from the Fraserburgh experiment is being stored by the New Standard Cold Storage Co., Ltd., in their plant at Aberdeen, where facilities for ultra low temperature storage were provided some years ago.

In the opinion of the Board, herring freezing, when fully developed at all the herring ports, will go far to provide the public with more herring and better herring, and will in large measure compensate the fishermen for the shrinkage of the traditional outlets for their catches. It cannot be expected, however, that any one process can be relied on to cure the recurrent problem of gluts. The ways of the herring are incalculable, and a scarcity one day can be followed by landings of several thousand tons more than the labour and transport at a port are able to deal with. Until science can discover some method of storing herring in enormous masses without the use of extensive plant, the problem of an occasional glut is likely to remain.

Valuation of Goodwill

JOHN LYMESTER

GOODWILL is the asset which it is most difficult for any food manufacturer to value, but it is normally only necessary to value it when a business is being bought and sold, and then there is seldom any tangible evidence as to its value.

Influencing Factors.

Many factors influence the value of the goodwill of a food manufacturing business, including the following:

1. The trend of the profits of the business and whether these are increasing or decreasing.
2. The trend of the turnover of the business and whether this is increasing or decreasing.
3. The period for which the business has been established.
4. The amount of competition in the section of the food manufacturing industry to which the business belongs and whether it is increasing or decreasing, and whether any new competitors of note have recently commenced business.
5. The amount of advertising undertaken and whether the trade name is well known.
6. The area of supply and the bulk of the goods.
7. The degree of personal connexion of the present proprietors with the business.
8. The period for which the present proprietors will stay and assist the purchasers in the business and the remuneration they require.
9. The availability of labour and the periods leases, patents, etc., have to run.
10. The public taste and whether this is changing and a new production taking the place of the goods now sold.
11. Whether the present owners will sign not to recommence in the same trade.

It should be noted that any value placed on patents, trade marks, etc., is actually part of the goodwill value and should be deducted from any calculated value for goodwill.

The effect of war-time controls should also be studied, for because of restricted supplies of certain goods and the zoning for transport reasons the public have purchased certain goods which they would not have done with adequate supplies and full competition.

Super Profits

The correct basis of valuation of goodwill is on a number of years' purchase of the "super" profits.

Super profits are the profits remaining after charging a salary to the owner, or partners, interest on capital, and after allowing for any special circumstances.

The number of years' purchase is normally ten, but depends on the full circumstances; but if all are favourable ten years is taken.

The following illustrates how the value is normally calculated:

Net Profits for the year to 30th September, 1940		£20,273
Ditto, 1941		21,204
Ditto, 1942		19,873
Ditto, 1943		21,403
Ditto, 1944		19,247
		5)102,000
Average Yearly Net Profits		£20,400
Less Salaries to Partners, paid according to services rendered:		
A.	£2,000	
B.	2,000	
C.	1,500	
D.	1,300	
E.	1,000	
		7,800
		£12,600
Less Interest on Capital required to purchase Assets other than Goodwill:		
5 per cent. on £90,000		4,500
		£8,100
Less Interest on Capital to acquire the Goodwill:		
5 per cent. on £54,000		2,700 (1)
Average Yearly Super Profits ...		£5,400 (2)

The Goodwill is ten times the Super Profits, that is:

£5,400 × 10 = £54,000.

Note: The figure marked (1), that is, the interest on capital to acquire the goodwill, is always one-half of the figure marked (2), that is, the Super profits.

This goodwill figure would, of course, on a sale be divided between the partners in the proportion that they share profits. Thus if the proportion was as follows:

A. 3/10ths; B. 3/10ths; C. 2/10ths; D. 1/10th; E. 1/10th,

the division of the goodwill would be as follows:

A. £16,200; B. £16,200; C. £10,800; D. £5,400; E. £5,400. Total, £54,000.

The Limited Company

In the case of a limited company, the matter would be dealt with as follows:-

Net Profits for the year to 30th November, 1940		£10,150
Ditto, 1941		11,000
Ditto, 1942		10,750
Ditto, 1943		11,120
Ditto, 1944		10,980
		£54,000
Add back Directors' Remuneration paid:		
Year to 30th November, 1940	£5,000	
" " " " 1941	5,000	
" " " " 1942	5,500	
" " " " 1943	4,000	
" " " " 1944	5,000	
	£24,500	
Total Profits for five years		£78,500
Add Law Costs charged in Accounts to 30th November, 1942		500
		£79,000
Less Capital Profit in year to 30th November, 1941		1,000
		£78,000
Average Yearly Net Profits		£15,600
Less Salaries which would have to be paid to new employees to undertake work now done by directors:		
A. General Manager ...	£2,000	
B. Sales Manager ...	1,000	
C. Accountant Secretary	750	
D. Factory Manager ...	1,500	
	5,250	
		£10,350
Less Interest on Capital to be invested to acquire Assets (other than Goodwill) less liabilities:		
5 per cent. on £87,000 (3)		4,350
		£6,000
Less Interest on Capital to be invested for the purpose of buying Goodwill:		
5 per cent. on £40,000		£2,000
Average Yearly Super Profits ...		£4,000

Goodwill equals 10 years' purchase thereof—that is, £40,000.

The figure marked (3) is, of course, obtained by verification and valuation of all other assets and deduction of all liabilities excepting, of course, Share Capital and General Reserves. If the company has issued Debentures or Shares with a fixed dividend right the amount of these issues is taken as a liability, but the interest or dividends thereon are taken as a charge against the profits when calculating the value of the goodwill.

Purchase of Shares

In the case of the acquisition of a limited company the assets can either be purchased therefrom when the actual company is not taken over or the shares acquired when the company is taken over in its entirety.

When the shares are purchased it is necessary to fix a price for each share.

Thus, assuming in the above example that the Issued Share Capital is £50,000 in one pound ordinary shares, the value is as follows:

Value of Assets less Liabilities ...	£87,000
Add Value of Goodwill	40,000
Total Value of Shares of Company	£127,000

Value of each £1 share is £127,000 divided by 50,000—that is, £2·54 or £2 10s. 10d. approximately.

In purchasing shares of a company it is normal, if you are acquiring the business, to buy all the shares. When buying the shares of a company, of course, despite the fact that in calculating the value of the shares a large figure is introduced for goodwill, that item of goodwill does not appear in the Balance Sheet, although in the case of buying the business of a sole trader or partnership it does.

When, however, the business of a sole trader or partnership is sold to a limited company any figure paid for goodwill represents an assent of that value in the Balance Sheet, and also when a business holds the shares of another company whether as an investment or as a subsidiary the price paid for such shares is the value shown thereon in the Balance Sheet of the purchaser.

When buying an interest in a partnership that is either the interest of one or more partners but not the whole partnership business, it is of importance to know whether the sum you pay for goodwill is to remain in the business or be paid to a retiring partner. The goodwill of the business will be calculated on the above basis and the incoming partner will pay a proportion thereof equal to the share he will receive of future profits.

Other Methods of Valuation

Two other methods for the valuation of goodwill are sometimes suggested.

The first is on a number of years' purchase of the net profits. Thus either two or three times the average net profits or the total of the net profits for the last two or three years is suggested. Although for well-established and profitable businesses a valuation on this basis often approximates to the valuation on the basis of super profits, the method does not allow for special circumstances; for example, when the profit does not merit the capital involved.

(*Continued on page 337*)

Fly Pest in Cheese Factories

FREDERICK BURKE, F.R.M.S.

THE cheese fly (*Piophila casei*) or, as it is sometimes called, the cheese skipper, is an insect found in many factories and warehouses, where it infests a variety of stored products. It is, however, in cheese factories where the insect finds its most favoured food and suitable conditions of temperature and humidity, and where it is frequently a particularly serious pest causing much damage and financial loss.

The maggots sometimes discovered in overripe and mouldy cheese hatch from eggs laid by this insect. These maggots, by their burrowing habit, can cause considerable damage to stored cheese.

Actual assessment of the damage done by the cheese fly is somewhat difficult to obtain, but it includes the loss due to the amount of cheese eaten, the spoilt appearance of all infested stock, and the nuisance and expense of control measures which the insect causes manufacturers and dealers. Presence of maggots in cheese also tends to lead to a loss of prestige for the cheese industry as a whole.

Although the cheese fly appears particularly to favour cheese as a food for its larval stage, the pest is by no means confined to this product. It is almost as serious a pest of bacon and ham. Moreover, the insect is reported to attack smoked beef, salted beef, margarine, smoked fish, and numerous other food products.

Life Cycle

As control of the fly in the cheese factory depends to some extent upon a knowledge of the habits and life-cycle of the pest, the following brief summary is included before passing on to consider preventive and repressive methods.

The cheese fly, before appearing as a mature insect, passes through three stages. These are egg, larva, and pupa. It is the larval or maggot stage which causes the damage to cheese, and it is also the most difficult one to control.

The adult female fly, which is about one-third the size of the common house-fly, lays its eggs singly, or in groups, either on the surface or in cracks and crevices of cheese. The usual number of eggs deposited is about 100, although the female is capable of laying five times as many.

A great deal depends on the existing conditions of temperature and humidity, but normally the eggs hatch into maggots in 24-48 hours. The extremely small newly-hatched maggots are whitish in colour. They immediately commence to feed by burrowing into the cheese, often penetrating so deeply that they escape detection until after serious damage has been done. The young maggots continue feeding for 1-2 weeks, after which time they are full grown.

At this stage the maggots or skippers have a peculiar habit of bending both ends of their bodies together and then suddenly releasing them, with the result that they jump forward a distance of 3-6 inches. It is this habit which has earned for them the appellation of "skipper".

The full-grown maggots, helped by their capacity for jumping, seek out dark and secluded spots in which to change to pupae. This stage is one which is readily recognised, because the pupae are reddish brown cases about ⅛ in. in length. They may be found under cheese-cloth, in corners of shelves, cracks in floorboards, and other similar places. It is important to note that the maggots never pupate in cheese, a point which is of some significance when control measures are considered.

From 7 to 12 days is usually required for the appearance of the adult flies, but, depending on temperature conditions, the time of emergence is often considerably delayed and may be extended as long as 5 weeks at a temperature of 50° F. The entire life-cycle, on the other hand, may be completed in 14 days, so it will be readily appreciated that, under favourable conditions, the cheese fly, if left to breed unchecked, can very soon become a serious pest in a factory.

Control Measures

One of the first essentials in any insect pest control is the maintenance of strictly hygienic conditions, and this applies with particular force to the control of the cheese fly. Dirty storage rooms, greasy shelves, dusty cupboards and corners all favour the development of the fly once it has obtained a foothold. It is therefore in the interests of the manufacturer to see that all refuse like scraps of old cheese is swept up and removed from the factory at the earliest possible opportunity. Shelves and dark corners must be searched and cleared of all fly pupae and kept scrupulously clean at all times.

Cheese which is found to be badly infested with maggots should be disposed of immediately to prevent infestation spreading. Precautions should also be taken to avoid storing slightly infested stock with uninfested cheese.

As a protective measure against infestation during storage, cheese should be carefully wrapped in suitable cloth or else treated with paraffin wax so as to form a thin coating on the surface.

Windows and doors of stores and curing-rooms,

and indeed of the entire factory, may with advantage be screened with fine wire gauge, 24-30 meshes to the inch, to prevent flies from entering. Ordinary window screening gauge is unsuitable for this purpose because of its larger size mesh.

The cheese fly is checked in its development by low temperature, and consequently the slow curing of cheese at temperatures below 50° F. greatly assists in preventing fly damage to cheese. Above this temperature the metabolism of the fly is speeded up and breeding increases rapidly.

Humidity is also an important factor in the development of the cheese fly, and cool dry storage rooms greatly facilitate its control. Under proper refrigeration of 30°-35° F. the insect causes little trouble.

Use of Insecticides and Fumigants

Cheese-curing rooms and stores when mildly infested with fly can be treated with an insecticide. Excellent insecticidal sprays can now be obtained, but, when available, one containing pyrethrum in oil is to be preferred. In the use of a liquid insecticide it is important to pay particular attention to cracks and crevices which are likely to harbour cheese fly pupae. It is also important to remember that frequent spraying is necessary for effective control. One application is rarely ever sufficient.

In cheese factories where the fly is exceptionally abundant fumigation is undoubtedly the only reliable means of control. Many fumigants have been advocated, from time to time, for the control of insect pests. For the cheese fly, however, carbon bisulphide and hydrocyanic acid gas are without doubt the most effective agents. They have the advantage that they do not impart any disagreeable flavour to cheese. And, further, no appreciable amount of these fumigants is absorbed by cheese, as has been proved by experiments conducted here and in America. It is unnecessary, therefore, to remove cheese during fumigation with these agents.

The carbon bisulphide fumigant is an oily liquid which gives off a vapour smelling somewhat like cabbage water. The vapour in sufficient concentrations is poisonous to all insects and to man. Since the vapour is about three times heavier than air, the liquid should always be exposed at the highest level possible. The amount of carbon bisulphide used largely depends on the airtightness of the premises to be fumigated. A reasonable average, however, is 6-10 lb. per 1,000 cubic feet of space. The liquid must remain exposed for at least 24 hours, and preferably at a temperature of 70°-80° F.

In use the greatest care should be taken with carbon bisulphide because, although the vapour has a powerful odour, it soon deadens the sense of smell, and in consequence an operative using the liquid may not realise he is exposed to high concentrations of vapour. Continued exposure to the vapour produces dizziness and finally suffocation.

The vapour is also highly inflammable, and stringent precautions must be taken to prevent fire. Electric switches should not be used during fumigation with carbon bisulphide, as a spark can easily be the means of an explosion.

A still more effective fumigant for the destruction of the cheese fly is hydrocyanic acid gas. Unfortunately it is deadly poisonous to man, and the greatest caution must be exercised in its employment. Only persons fully experienced with this fumigant should be allowed to handle it, and it should be used as directed in the instructions obtained with the substance. Most efficient results are obtained when the gas is left exposed for 24 hours.

Although fumigation, when correctly carried out, will clear premises of cheese flies and their pupae, the maggots, being buried in the cheese, are somewhat more difficult to eradicate. It is therefore frequently desirable to re-fumigate premises after the lapse of about a fortnight. During this time maggots which escaped the first treatment will have become either pupae or adult flies and with the second fumigation will succumb.

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Valuation of Goodwill

(*Continued from page* 335)

The second is on a number of years' purchase of the turnover. Although this basis is often taken when buying professional practices, such as those of doctors and accountants, it should never be adopted for the valuation of the goodwill of a food manufacturer's business, as sales with little or no profit may be included.

Finally, the whole question of goodwill is one of the greatest difficulty and should be approached with the utmost caution; it must be remembered, however, that the price will always depend on the price the buyer will pay or the seller accept, and this will be governed by the number of businesses for sale and the number of people who wish to buy businesses. As a result of the war and the difficulties of being able to start in business, excessive prices are being paid for what is termed goodwill, but which in fact is only the right to carry on business. In my opinion a buyer should not pay, even in war-time, a price higher than the true goodwill value based on super profits.

Trade News

Charter Operations

The following notice, which was posted on the Baltic Exchange recently, was received with considerable satisfaction:

"The chairman of the Baltic Exchange is pleased to advise members that the Ministry of Food have agreed to employ chartering agents on certain voyage charters for the carriage of full cargoes of such commodities as grain, sugar, rice, oilseeds, etc.

"The scope of such employment is at present limited to voyage charters on which the Ministry of War Transport have agreed to pay chartering agents commissions, or in cases where foreign owners agree to pay chartering agents commissions on vessels nominated to carry out Ministry of Food charters under United Maritime Authority arrangements.

"Chartering commissions earned will be paid to the credit of the Baltic Exchange Chartering Committee. A detailed scheme covering eligibility and participation will be issued in due course."

Community Restaurants

In 1943 the London Council of Social Service carried out a detailed survey of some 40 Communal Restaurants in London, and subsequently issued a report on the social value and implications of such restaurants. A recent publication, *Community Restaurants in Design*, by F. Le Gros Clark, M.A., with designs by L. H. Bucknell, F.R.I.B.A., and Ruth Ellis, F.R.I.B.A. (London Council of Social Service, 2s. 6d. post free), which is in the nature of a sequel to the previous report, gives alternative plans for a "Model" Community Restaurant, together with a written report and short appendices on Construction and Costs.

The plans are intended to demonstrate the main principle of design, which should be incorporated in the building of the restaurants. The report states that, provided the public has the service it needs, it is to the writers an open question whether such Community Restaurants are controlled by a local authority or by a firm of commercial caterers. But they add that, in their opinion, the public should be guaranteed against deterioration in quality or any undue increase in prices, and also that the manager should be a qualified person.

New Food Containers

Rations for the armies fighting in Burma are being packed in aluminium containers, which are lighter than paper.

OBITER DICTA

- The Ministry of Food has more secretaries than the prophet Daniel, and he had 300.—*A Stornoway drifter skipper.*
- If you have a tin of spam in the cupboard, hang on to it for the coming winter.—*"Vigilant" in the "Sunday Chronicle."*
- We have been thankful for our food, but scarcely interested in it.—*Elizabeth Coxhead writing in the "Liverpool Daily Post."*
- But it is a treat to see fish waiting for the customers instead of the customers waiting for the fish.—*"Daily Express."*
- A spoonful of yellow dust plus twice its displacement in water was loudly boosted as equal to any hen's effort.—*Isabella McRee in a letter to "The Spectator."*
- Apparently, some folks imagine that the freezing of the ice cream kills the naughty bacteria. It only "stuns them"; they revive in due course.—*"Evening Sentinel."*
- If the women who stand really get busy and make their influence felt, they can ban needless queueing. One of these days they may even stop wars too.—*"The Star."*
- People want a real holiday and I don't blame them. How would farmers like to spend their holiday down a coal-mine? *Mr. F. Scott at a Farmers' Union meeting.*
- Quite frankly I think England has passed its zenith, that as a nation we have lost our soul. . . . We are, in my view, going headlong to perdition and oblivion. . . .—*Rector of Bromborough.*
- When I see women queueing up I can see a change. People want more food, and when the Ministry of Food say people are all the better for shortages I say it is all tommy rot.—*Chairman of the Stratford Magistrates.*
- I enjoyed my short stay in England as much as anything I ever did in my life. British hospitality exceeds anything I have ever heard about before except possibly that of Australia and New Zealand. If you folks are able to make the visitor feel so welcome in war-time, what must it be like in peace-time.—*Dr. L. V. Burton, Editor of "Food Industries," U.S.A.*

A.B.C.M. Appointments

The Council of the Association of British Chemical Manufacturers at its July meeting appointed Mr. J. Davidson Pratt, O.B.E., M.A., B.Sc., F.R.I.C., M.I.Chem.E., previously General Manager and Secretary, as Director and Secretary. Mr. R. Murdin Drake, O.B.E., M.Sc., and Mr. Allan J. Holden, B.Sc., F.R.I.C., who during the last five years have been Assistant Managers, have been appointed Joint Managers of the Association.

Fish-Freezing Factories

Representatives of William Milne, Ltd., cold storage experts, Leith, and the North British Cold Storage and Ice Company, Ltd., Leith, are undertaking a tour of West of Scotland fishing ports to discuss with local authorities the possibility of setting up a chain of factories for the quick freezing of fish.

They opened their tour at Oban, when a conference was held with the Town Council, and the advantages of Oban as a freezing centre were stressed. Steps just taken by the Town Council to revive the local fishing industry on a big scale were discussed.

The Town Council have offered the manufacturers every facility to set up a freezing plant at Oban to deal with large landings.

"It's Happening Again"

Ernest R. Troughton, O.B.E., who is managing director of Lavino (London), Ltd., and chairman of International Diatomite Co., Ltd., and of Moler Products, Ltd., has written a book entitled *It's Happening Again*.

Mr. Troughton spent several years in Germany and Belgium in the first World War in the British Army. During the occupation he was a staff officer for civil duties with the British Army of the Rhine, and later on the staff of the British High Commissioner at Coblenz. His contacts gave him excellent opportunities for observation.

He suggests that the appeasement of Germany took place much earlier than is generally supposed, and that what happened at the end of and after the last war is likely to be repeated unless the United Nations keep a free hand to enforce Total Peace.

The book opens spectacularly with a reference to the British Bureau for Ruhr Information and names the officials, and goes on to discover German propaganda in most surprising circumstances. The author is a vivid commentator, and his book is bound to sell well at 7s. 6d.

Industrial Research

B.F.I. TO CALL A TWO-DAY CONFERENCE IN LONDON

At a recent meeting of the Federation of British Industries Grand Council, under the chairmanship of the President, Sir Clive Baillieu, it was decided to convene in London a two-day conference on the subject of "Industry and Research." Special emphasis will be laid at the Conference—to be called in the late autumn or early spring—on the practical means by which research can assist industry and promote industrial efficiency, exports, full employment, and a higher standard of living.

Dr. W. T. Griffiths announced that the Federation had appointed as head of the F.B.I. Research Secretariat and Secretary of the F.B.I. Industrial Research Committee Dr. B. J. A. Bard, B.Sc., D.I.C. Dr. Griffiths said the duties and functions of the F.B.I. Research Secretariat would include the encouragement and fostering of industrial and national interest in research, maintaining contact with all industrial research organisations, and providing a service whereby advice, assistance, and information could be obtained and contacts made. Close touch was being maintained with the Department of Scientific and Industrial Research, which was represented on the F.B.I. Industrial Research Committee.

A first task of the F.B.I. Research Secretariat, said Dr. Griffiths, would be to organise and conduct a survey of existing research facilities in Britain. Amongst other activities, lectures and addresses would be arranged, and, where appropriate, articles written by members of the F.B.I. Research Committee.

Chief among the immediate plans of the Industrial Research Committee was the proposal for the calling of a conference of those who were organising or conducting research in industry in order that they might present their views and give the results of their experience to industry. His Committee felt that, whilst many industrialists wished to carry out research, they did not all understand what it involved, and had not the necessary staff and facilities. He and his colleagues realised that, at the moment, little could be done to extend firms' research activities because of the shortage of staff and laboratories. They could, however, advise on how best available research could be utilised and applied in the service of industry. The Committee believed there was urgency in the need to reduce the time-lag sometimes existing in this country between research and its application or development.

After discussion the Grand Council unanimously endorsed the Committee's report and agreed that a conference on research and its significance for industry be called in London.

Sir Clive Baillieu, addressing the Council on the Federation's plans for exports, said overseas contacts were being re-established as and when conditions permitted in countries that had been overrun by the enemy. The Federation's Foreign Director, Mr. C. F. I. Ramsden, had already visited France and Belgium and had made arrangements for restoring the Federation's representation there. Mr. Ramsden was shortly to visit Norway, Sweden, Denmark, and Holland, and later Italy, Switzerland, and Spain. By this means the F.B.I.'s contacts would be renewed and arrangements made for the future.

Continuing, Sir Clive said the Federation possessed a firmly established overseas organisation—with approximately 100 overseas representatives—through the medium of which it rendered a large range of services to members. The F.B.I. Export Committee, of which Mr. Philip Wright was chairman, consisted of export directors or executives who were intimately aware of overseas trade problems. That Committee had already produced a valuable report on Export Trade Methods, and special reports had been received from a number of countries. He recommended, and the Council agreed, that a small special committee of the Export Committee be appointed to bring under continuous review immediate problems relating to the export trade.

Mr. E. B. Bennion

Mr. E. B. Bennion left the Ministry of Food at the end of July and is resuming his duties at the National Bakery School, Borough Polytechnic.

Mr. John Netherway

After 51 years' service with Allen and Hanburys, Ltd., Mr. John Netherway, a director and the secretary of the company, has retired from the position of secretary, but will remain on the board as one of the managing directors and as vice-chairman of the company.

De Gruchy and Brasford

We are pleased to be able to inform their many friends in the trade that the factory of De Gruchy and Brasford at St. Helier, Jersey, is intact. Throughout the German occupation they have been fully engaged in the manufacture of rationed foodstuffs for the Jersey people only.

Extraction Pump

Details of an improved type extraction pump are incorporated in leaflet No. 271 published by Kestner Evaporator and Engineering Co., Ltd. This pump is specially designed for the continuous extraction of liquor under a vacuum from evaporators, stills, reaction vessels, etc.

Lectrodryer Equipment

A new brochure giving details of Lectrodryers for drying air and other gases has been issued by Birlec, Ltd. The booklet describes the various applications of this equipment, which include the dehydration of many organic liquids and its use in connexion with air-conditioning problems.

Queueing is a war-time bugbear, but what about this pre-war queue outside Selfridge's ?

Change of Title

The Allied Bakeries, Ltd., advise a change of title as follows: Allied Bakeries, Ltd., Laboratories, c/o W. J. Barton, Ltd., Kemp Road, Dagenham, Essex.

Handling of Food Products

In the food industry the job of moving materials at the proper speed in harmony with production and of avoiding accumulation of materials offers an intricate problem, for while at certain stages in a process fixed conveyors could be utilised in the forward movement of materials, there are stages where an inflexible conveyorised system is inadequate and recourse must be had either to manual handling, or to portable-mechanical, materials-handling equipment.

The type of mobile equipment most favoured for this purpose is the electric truck or tractor. The main point of such equipment is its mobility. The truck can enter buildings through narrow doors and aisles, and go direct to the point of origin or destination of the materials handled, thereby eliminating numerous re-handlings.

The illustration shows an electric truck especially suited to the food industry. With a driver it is claimed that the truck can do the work of eight men at three times the speed at approximately quarter the cost, maintenance, running expenses, and wages being taken into account.

The truck has a loading capacity of 3 tons at ½ to 6 m.p.h.; a turning radius of 9 ft. 6 in.; length overall, 9 ft. 10 in.; width, 3 ft. 9 in.; height overall, 4 ft. 4 in.; wheel base, 5 ft. 5 in.; and track, 3 ft. 2 in. The platform height is convenient for easy loading—that is, 24 in. above ground level—while a platform 7 ft. 10 in. long and 3 ft. 9 in. wide provides ample space for bulky objects.

Quick-Frozen Fruits

Quick-frozen fruits and vegetables are expected to be on sale again in November, the Ministry of Food having agreed to grant facilities for processing. Among the varieties to be marketed are: Strawberries, raspberries, gooseberries, currants, spinach, asparagus, green peas, runner beans, and broad beans. Retail prices are expected to be only some 10 to 15 per cent. above pre-war level, and the minimum price for a half-pound package will be only 1s.

In addition to packages of domestic size, there will be packages of larger capacity suitable for hotels and other caterers.

Institute of Physics

The report for 1944 of the Institute of Physics which has just been issued shows that its membership increased by some 15 per cent.—a new record. Despite war-time difficulties the Groups and the Branches both at home and overseas held meetings and conferences covering a wide range of technical and professional subjects. A new and very successful venture was the publication of a series of lectures given before the Industrial Radiology Group as a *Handbook of Industrial Radiology*. The report also mentions many other matters which the Board of the Institute considered during the year, including Patent Law Reform, Higher Technical Education, the Limitation of Radio Interference, and professional matters.

Change of Address

From July 31, 1945, the address of the Institute of Physics and of its *Journal of Scientific Instruments* was changed to 19, Albemarle Street, London, W. 1. Telephone: Regent 3541.

Conference on Automatic Control

The Institution of Chemical Engineers, the Institute of Physics, and the Chemical Engineering Group of the Society of Chemical Industry announce that the one-day Joint Conference on "Instruments for the Automatic Controlling and Recording of Chemical and Other Processes," which was postponed in September last, will take place in the Royal Institution, London (by kind permission of the Managers), on Friday, October 19, 1945.

The purpose of the Conference is to promote the interchange of knowledge and experience between those using automatic controllers and recorders in different fields and to encourage collaboration between physicists and chemical engineers. The Conference will be open to all interested without charge, whether members of the organising bodies or not. Further particulars will be sent in September to those sending a request for them to the Organising Secretary, Joint Conference, c/o the Institution of Chemical Engineers, 56, Victoria Street, London, S.W. 1.

As there have been so many changes of address, those who previously asked for further particulars are asked to repeat their request.

Lyons' War Work

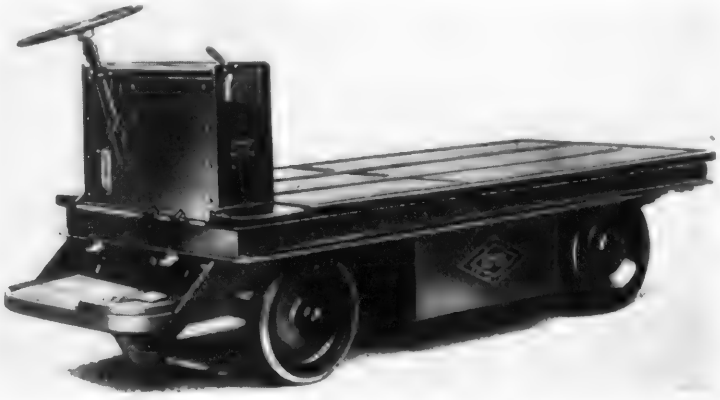
Millions of people have been served by J. Lyons and Co., Ltd., in their establishments during the war, but none knew that the company was at the same time helping to build the Bailey bridge, packing millions of composite rations, managing a large munitions factory, and carrying out other war work outside their normal scope.

The first hint of all this secret activity was given by Mr. Harry Salmon, J.P., in a statement issued prior to Lyons' Annual General Meeting held on June 28, 1945.

Sections of their engineering works changed over from the making of kitchen apparatus and refrigerating repairs to the making of parts for the famous Bailey bridge and the manufacture of shells, aircraft parts, machinery for washing bombs, etc.

Lyons began to pack composite rations in November, 1942, and in the succeeding two years they delivered a total of 3,541,115. The joinery department assembled the necessary cases for these packs from materials supplied as well as turning out 450,000 cases from their own materials.

More than half of Lyons' cocoa production last year was devoted to the Forces, while they supplied coffee to the American troops as well as to the British.



Electric trucks combine the essential features of hygiene and silence with efficient materials-handling. *Courtesy of Lansing Bagnall, Ltd.*

Companies

Scribbans and Co., Ltd.

Mr. Louis Nicholas, J.P., the chairman, presided at the eighteenth annual general meeting of Scribbans and Company, Ltd., held in London.

The following is an extract from his statement circulated with the report and accounts: I am pleased to report that the business of the company and its subsidiaries has continued to show satisfactory progress, although practically all the pecuniary benefit which has resulted has to be passed on to the Chancellor of the Exchequer in the form of Excess Profits Tax. This improvement is satisfactory, as the difficulties caused by the scarcity of labour and shortage of raw material have increased, and the labour position is more difficult at the present time than at any time during the war.

The only comment I need make on the balance-sheet and profit and loss accounts is to draw your attention to the alteration in form to bring the company's accounts into line with modern practice, and to point out that no depreciation has this year been written off fixed plant and machinery, as they have, in the opinion of the directors, a value considerably greater than the figure at which they stand in the balance-sheet.

The shareholders will notice the recommendations contained in the directors' report with regard to the sums to be carried to general reserve, development reserve, and reserve for future taxation, and that the directors recommend the same final dividends on the Ordinary and Deferred shares as last year, feeling, after careful consideration, that it is most desirable in the interests of both the company and the shareholders to conserve its resources in view of post-war developments.

As this is my first year as your chairman, I am anxious to deal in as practical a manner as possible with the vexed item of goodwill, which stands in our balance-sheet as £1,117,549. If you look at the other side of the balance-sheet you will see that our reserves, including the balance to be carried forward, now stand at £597,493, which, if subtracted from the goodwill figure, leaves a difference of £520,056. It is this difference which I should like to see covered. It has been the practice of this company and its subsidiaries, as a policy of prudence, to write down heavily certain of their assets, which at the present time are valued at a figure considerably in excess of the figures appearing in their various balance-sheets. We propose, therefore, at the time best suited to the interests of the shareholders, to write up these assets to their true value, which I hope will nearly if not quite make up the difference between our reserves and the goodwill figure. I have thought it right to mention this matter, as it is in our minds and will be dealt with as soon as practicable.

As most members will be aware, the policy of the board for some years has been gradually to broaden the base of your company, and you will be interested to be given some indication of the company's interests. In the Midlands your company operates its factory in Smethwick, Birmingham, which is one of the largest producers of cake and sponge goods in Great Britain. During the war it, and the factories of the company's subsidiaries, have supplied large quantities of consumable goods to the Services and organisations catering for the welfare of the Forces.

Further sums have been spent during the year in repairing the damage caused to this factory by enemy action in July, 1942. A portion of these repairs is temporary, and there is still considerable work to be done to effect full replacement, but the greater portion of this cost should be recoverable under the War Damage Act. In London your company is represented by George Kemp, Ltd., nearly the whole of whose capital is owned by your company. George Kemp, Ltd., has one of the most modern factories in the country, manufacturing biscuits of all classes.

In Scotland the company is represented by its wholly owned subsidiary, Scribbans-Kemp (Scotland), Ltd., whose factory is situated at Leith, and produces both cakes and biscuits. The present factory is too small even for present requirements, and as soon as circumstances permit it is the intention of your board to acquire or erect a new factory in the immediate neighbourhood. Negotiations are in progress with this object. In Northern Ireland we are represented by Scribbans-Kemp (Northern Ireland), Ltd., a wholly owned subsidiary which manufactures cakes and biscuits of various kinds. In addition, your company has a small branch in Dublin producing slab cakes and small cakes.

Your company also owns the whole of the share capital of Hurst and Payne, Ltd., a Birmingham transport company which, with its subsidiary, Red Arrow Deliveries, Ltd., carried a considerable amount of the company's transport prior to the war. These companies were taken over by the Ministry of War Transport in 1943, and are still controlled by that Ministry. As mentioned in the last report, your company owns the whole of the Ordinary share capital and a portion of the Preference share capital of Meesons, Ltd., retailers of sweets, chocolates, etc., having branches in Manchester and other provincial towns. The outlook for all these businesses appears to be promising, although the shortage of labour and raw materials continues to cause anxiety.

The company is looking forward to the return of the members of its staff who have served with H.M. Forces, all of whom can be readily reabsorbed into the company's organisations. A scheme has been prepared to assist these men and women not only to refresh but to bring up to date their knowledge of the company's trade. Before closing, I would like to pay tribute to our executives and the executives of all our subsidiary companies, and to every employee of the various companies, for the way in which they have overcome the many difficulties they have had to face during the war years, and I am sure you would like me on your behalf to express to them our most grateful thanks.

Ladies and gentlemen, we meet happy in the knowledge that the war in Europe has been won. When we meet next year I hope a similar result will have been achieved in the Far East, and the world will once more be at peace.

The report was adopted.

Vitamins, Ltd.

At the seventeenth annual general meeting of Vitamins, Ltd., Mr. H. C. H. Graves, the chairman, reported another year of progress. In a detailed analysis of the accounts, he pointed to the increase of about £15,000 in stock-in-trade, which compared with a decline of over £30,000 a year ago.

The net profit of £31,077 was almost identical with last year, and any substantial alteration—or in the 25 per cent. dividend—was unlikely so long as 100 per cent. E.P.T. obtained.

Cow and Gate, Ltd.

The following are extracts from a statement by Mr. W. R. B. St. John Gates, the chairman and joint managing director of Cow and Gate, Ltd., circulated with the report and accounts at the thirty-sixth ordinary general meeting.

The company has gone ahead during the last ten years in all branches of the milk industry, as before then we were almost entirely concerned with the manufacture of infant and invalid foods. For example, during the past year we have erected yet another large spray powder plant for the manufacture of the type of milk powder used for baking, ice-cream making, and general domestic purposes. I am given to understand that this new plant is one of the largest of its kind in Europe.

Steady progress has been made in all sections of the business, and we look forward to the time when we may be able to have a little more freedom in regard to our export trade, as I feel, with many others, that this is a matter which must receive the closest attention and the utmost support from the Government itself.

John Mackintosh and Sons

At the twenty-fifth ordinary general meeting of John Mackintosh and Sons, held on July 17, Sir Harold Mackintosh, Bart., J.P., chairman, said that the confectionery industry had been fortunate in having its interests so well served by its war-time associations under the guidance of the Ministry of Food.

Turning to the profit and loss account, he announced that the profit brought in from trading, after charging adequate depreciation and providing for deferred repairs, contingencies and excess profits tax, was £158,937. After allocations, including the sum of £10,165 for employees' pension fund and £40,000 for income-tax, there remained a sum of £107,431. To this we brought forward from last year the sum of £151,824, leaving a disposable balance at this stage of £259,255, against which there has been paid during the year interest on the debenture stock and the customary Preference and Preferred Ordinary dividends for the year 1944, leaving a balance of £190,255. Out of this sum the directors recommended a dividend of 10 per cent. on the Deferred Ordinary shares and a participating dividend of 5 per cent. on the Preferred Ordinary shares, these two absorbing with tax £30,000, and that the balance of £160,255 be carried forward.

Fruit and Produce Exchange

Trading profits of the Fruit and Produce Exchange of Great Britain for the half-year ended March 31, 1945, compare favourably with the previous year. Trading profits to £75,035, against £102,252 for the full twelve months, and provision for taxation for the half-year totals £65,500, compared with £83,300. The net available balance before tax totals £73,917, against £100,726, and tax absorbs £65,500. Current assets at £448,285 compare favourably with current liabilities at £307,169. A dividend of 3d. per share is being paid on the company's 1s. ordinary shares. The 20 per cent. non-cumulative preference shares, 6s. each, are quoted at around 19s., yielding 6·3 per cent.

New Company

The well-known growing and merchanting business of the late Mr. J. M. Stokes, of Evesham, Worcestershire (who died in December, 1942), and which has, since his death, been carried on by his executors, has, with the approval of the Chancery Court, now been purchased by a private limited company (called J. M. Stokes, Ltd.) with an authorised share capital of £120,000. The new company has also purchased the undertaking of Messrs. Edwards and Bent, Ltd., fruit pulpers and horticultural chemists.

Bovril, Ltd.

The thirty-seventh ordinary general meeting of Argentine Estates of Bovril, Ltd., was held in London recently.

In the profit and loss account the net profit on trading shows a reduction of £8,000, due to decreased estancias profits. The interest on the debenture stock has, of course, disappeared from the profit and loss account. The balance carried down is very much the same as last year and once again a Preferred Ordinary dividend of 3 per cent. was recommended to be paid.

Overseas Items

Argentine Frigorifico By-Products

Reflecting a decline in imports, officials are reported to be preparing a subsidy programme whereby the Foreign Economic Administration will undertake to purchase River Plate frigorifico by-products from offerings submitted by importers on the basis of prices in excess of levels paid by Europe.—*Reuter.*

New Packing Material

A moisture-proof packaging material, made of aluminium foil with a vinyl resin coating and cloth backing, has been developed in the U.S. By replacing the present standard packaging material, Pliofilm, a rubber derivative, it is expected to save 70,000 pounds of natural rubber a month.

Though its use is at present restricted to military purposes, the manufacturers foresee a large variety of post-war uses, including the packing of tobacco and foodstuffs.

Two different processes are at present being employed in the manufacture of the material. One is the coating of aluminium foil with the resin, which forms a film, and the other method combines the foil and a preformed resin sheet by pressure and an adhesive. Cloth is applied to one side to guard against tearing in both cases.—*Reuter's Trade Service.*

Argentine Victory Cattle Show

The Argentine Rural Society announces that the next cattle show at Palermo will be dedicated to the victory of the United Nations. Visitors to the show from England will include the President of the Royal Agricultural Society, Sir George Courthope, Brigadier Lord Lovat, the Commando leader, who will judge the shorthorn class; Mr. Alexander Leddie, who will judge the Aberdeen Angus class; and Mr. Edmoore of Brampton Bryan, Herefordshire, who will judge the Herefords.—*Reuter.*

U.S. Meat Plan

A six-point programme to encourage greater meat production and improved distribution has been announced by Mr. F. Vinson, the Director of War Mobilisation.

The plan includes a Government subsidy of 50 cents per 100 pounds to cattle feeders from May 19, an increase of 25 cents in the subsidy for all grades of cattle, effective from June 4, and an increase of 40 cents in the port subsidy, retroactive from April 1.

The Government promises to give six months' advance notice to producers when the lowering of the support prices for beef cattle is contemplated.—*Reuter.*

Mould Reduction Methods

Where relative humidity is above 87 per cent. surface infection of meat is increased by air motion, according to Dr. Arthur W. Ewell, consultant to the Westinghouse Lamp Division, Bloomfield, N.J. Air motion at relative humidities under 85 per cent. tends to reduce infection, he states, but at the cost of desiccation of the meat surfaces.

In properly operated meat storage rooms, the surface infection is primarily mould, he points out. The flesh below, after trimming, is uninjured, but there is obviously economic loss. Ewell is of the opinion that, under limited conditions, carbon dioxide can be used as a sterilising agent to reduce mould, explaining that although it does not destroy infection, it is very effective in inhibiting growth if concentrations of 5 to 20 per cent. are used. He attributes this effect to "a specific property of carbon dioxide," declaring it is not due to reduction in the oxygen content of the air.

"Bactericidal lamps are used in many hundred large and small meat storage rooms," asserts Ewell, "where they are successful in controlling mould and bacteria even at high temperatures and humidity higher than customary."

Development and application of bactericidal lamps have been acceler-

ated by accurate photocell meters for measuring both radiation intensity and quantity of radiation during a given time. A platinum photocell responds only to the wave lengths which produce ozone—*i.e.*, below 2,000 Ångström units. A tantalum photocell responds throughout the bactericidal spectrum, which is between wave lengths 2,000 and 3,000, with 2,537 being nearest the wave length of maximum bactericidal effect.

"A striking application of the use of bactericidal lamps is in the rapid tenderising of beef," Ewell states. "By raising the temperature from about 36° to 60° F., the time required for tenderisation is reduced to approximately one-tenth. This high temperature, together with the necessary high humidity to prevent desiccation and accompanying injury to the meat surface, would result in serious surface infection without a bactericidal agent."

Personnel subjected to intense radiation for any length of time suffer from conjunctivitis and erythema of the skin, it is said. However, if lamps in storage rooms are properly installed in respect to location and number, this hazard can be obviated, according to the Westinghouse spokesman.

New Canning Industry

The establishment of a fish canning industry in Ceylon is now being considered by the Fisheries Department, and a motion on this subject will be considered at the next meeting of the Fisheries Advisory Board.

It is proposed that the industry shall be established in collaboration with the authorities in India.

The organisation of fish curing yards and canning factories was first discussed as far back as 1937. At present large quantities of fish are thrown away daily in Ceylon for want of proper curing methods and facilities.

Smoked Meat Products

Three pamphlets issued by the American Meat Institute's Department of Scientific Research in co-operation with the Committee on Scientific Research and the Provisions Committee, emphasise the necessity for care and refrigeration of the modern "cook-before-eating" and "ready-to-eat" type smoked meats.

The pamphlets are identified as follows:

1. "Recommendations Concerning Processing and Handling of Cook-Before-Eating and Ready-to-Eat Smoked Meat Products." This pamphlet is intended for study by company executives and operating personnel in charge of preparing, curing, processing, and making ready for shipment these modern types of hams.

2. "Cook-Before-Eating and Ready-to-Eat Smoked Meat Products are Perishable—How to Take Care of them." Officials and employees of wholesale and retail meat organisations responsible for receiving, storing, and selling these products will find valuable information in this pamphlet.

3. "Important Considerations Concerning Processing and Handling of Cook-Before-Eating and Ready-to-Eat Smoked Meat Products." This amplifies the details contained in Pamphlet No. 2.

Iraq Wants Agricultural Equipment

A statement published by the Iraq Ministry of Economics says: "Iraq earnestly desires to sell this year's Zahdi date crop and the director of the Date Association is in close touch with British firms and importers to reach agreement on such purchases.

"Iraq needs more agricultural machines and tools to develop her forests with a view to increasing her national wealth, and believes Britain can and will help."—*Reuter.*

U.S. Report on European Food Position

Prompt unification of military and civilian authority and direction, and planning to avert potential famine conditions in Europe were urged by three members of the Agriculture Committee of the U.S. House of Representatives, who recently returned from a six weeks' tour, during which they observed food production abroad.

American membership in the International Food and Agriculture Organisation is also strongly favoured by the group.

They had been most impressed and most concerned by a lack of official direction over food production in some of the countries, particularly in France. They found strict supervision and satisfying production in the United Kingdom and in Germany. Everywhere in Europe, except in England, the food situation is "muddled" and suffering from a lack of leadership on the part of the respective European Governments.

The representatives reported that the "most drastic and intensive" food production programme they found was in the United Kingdom.

Plans to Feed Europe

The Canadian Department of Labour has made extensive plans to encourage a heavy food production in the Dominion this year, having in mind the needs of devastated Europe.

Mr. Humphrey Mitchell, Minister of Labour, has indicated the scope of the proposed measures, which include an exchange of harvesting equipment and crews between Mid-Western, U.S.A., and Canadian prairies.—*Reuter.*

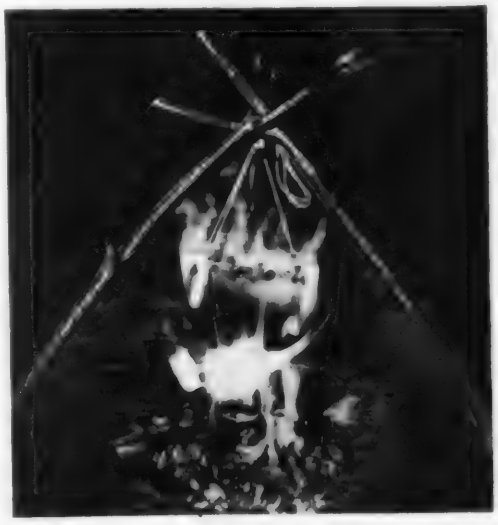
More Food Control !

In the Gold Coast, as in all British territories, many restrictions have been abandoned since VE day. But one division of the Colony has a new one, where the Chief has taken steps to control the gathering of snails. He has empowered all lesser chiefs to restrict the collection of immature snails and snails by night, and people who take the order lightly will be liable to two months' imprisonment.

The Chief, called the Offinsohene, hopes that these steps will improve the quality and quantity of snails, which are much used for food in his district.

Collapsible Cooking Utensils

An ingenious collapsible cooking utensil is being used by the U.S. Army.



The container is made of asbestos fabric impregnated with synthetic rubber and was developed by the United States Rubber Company.

American airmen and members of the Medical Corps have been the chief users of this article, and it has served the dual purpose of a cooking utensil and a steriliser for surgical instruments in the field.

Now that the war in the Far East is at an end, many other uses for this container may be envisaged. It would surely be a very useful addition to the camper's outfit, and be far less cumbersome than the usual paraphernalia.

News from the Ministries

Allocations of Oils/Fats

As from permit period beginning July 22, 1945, and until further notice, oils/fats will be allocated to trade users as follows:

Against authorised quantity of cake margarine: ¼ cake margarine, ¾ lard.

Against authorised quantity of compound cooking fat: ¼ compound cooking fat, ¾ lard.

Against authorised quantity of lard: All lard.

Fish friers only will receive one-third oil and two-thirds lard against their authorised quantity of soft or hard oil.

Fruit Pulp

The Fruit Pulp Order, 1945 (S.R. & O., 1945, No. 911), prescribes new maximum prices for fruit pulp manufactured in the U.K. and came into force on August 5, 1945.

The Order revokes the Fruit Pulp Order, 1944 (S.R. & O., No. 798), and re-enacts its provisions substantially unaltered. It is made clear that the definition of fruit puree includes fruit paste. Manufacturing licences granted under the 1944 Order are maintained in force, as are also licences granted under Article 11 of the 1944 Order in respect of the purchase or sale of apple pulp. Licences for the manufacture of fruit pulp and puree granted under the Jam, Marmalade, and Preserved Fruit (Licensing and Control) Order, 1941, S.R. & O., 1941, No. 591, are cancelled and fresh licences in replacement will be issued under the new Order. Manufacturers affected by this provision should await further communication from the Fruit Pulp Section of the Ministry.

Appointment

Mr. M. I. Hutton, C.M.G., head of the British Food Mission to North America, has been appointed United Kingdom representative on the International Wheat Council in succession to the late Mr. E. Twentyman.

Mr. P. J. Wheeldon

Mr. P. J. Wheeldon, O.B.E., Deputy Secretary, Divisional and Local Services Department, retired on July 29 on grounds of ill-health. High appreciation of Mr. Wheeldon's services, first as Principal Establishment Officer and subsequently as Deputy Secretary, have been expressed by the Minister of Food.

Mr. S. W. Hood is being promoted to the rank of Deputy Secretary and will become responsible for Divisional and Local Services Department.

A MESSAGE

to *Food Manufacture* and its readers from the Minister of Food.

THE RT. HON. SIR BEN SMITH, K.B.E., M.P.

Photo: Ministry of Food Copyright.

I would like to thank you for giving me the opportunity to send a message through you to your readers.

In taking over this new and difficult task I earnestly hope your readers and colleagues in the food trades will continue to give to the Ministry of Food the splendid support and assistance they have given throughout the war.

Without the unique co-operation which has existed between the Government and the food trades it would never have been possible to put into effect the policy of "fair shares for all."

I look forward to and rely upon your valuable help without which food control cannot continue to be successful.

Meat Products, Canned Soup and Canned Meat (Control and Maximum Prices) Order, 1944

Arising out of the above Order, it will be necessary for any person holding a wholesale licence under the Food (Restrictions on Dealings) Order, 1941 and 1943 (S.R. & O., 1941, No. 1234 and 1943, No. 1769), and wishing to sell by wholesale Hogs Pudding, Haslet or Aislet, or Slicing Sausage, to apply to the Director of Meat and Livestock, Rydal Mount, Lansdowne Road, Colwyn Bay, North Wales, enclosing the existing licence for amendment.

Import of Bakery Machinery

Enquiries have been received from a number of manufacturers who desire to import machinery of a type which is unobtainable in this country. Any firms wishing to make application for the necessary facilities should obtain the requisite forms from the Import Licensing Department of the Board of Trade, 1-6, Tavistock Street, London, W.C. 1, and send them when completed to Ancillary Materials Division, Ministry of Food, Rydal Hut 5, Colwyn Bay.

No general undertaking can be given, but it is hoped that licences will be issued in all reasonable cases.

Science and Agriculture in U.S.S.R.

The number of soil workers in the party of 20 British scientists who recently visited Moscow and Leningrad as guests of the Soviet Government for the two hundred and twentieth anniversary of the Academy of Sciences, is an indication of the importance the Soviet authorities attach to agricultural science, and especially to soil science.

This attitude was abundantly demonstrated by the scale and quality of the work in progress in the many institutes and colleges the agricultural party was able to visit. The Dokuchaiev Institute for Soil Research has well-equipped laboratories in Moscow, a fine soil museum in Leningrad, and many sub-stations and field parties in different parts of the Union. It continues and extends the classical Russian work in soil classifications and survey, on the one hand applying it to individual collective farms, and, on the other, attempting a general synthesis by making new soil maps of other continents.

The outstanding impression is of carefully organised team work on a vast scale with the unfettered development of all branches of both pure and applied science.

Information and Advice

Strawberry Jam

B.234. *The enquirers, the owners of a home-made jam business, seek advice on making up Canadian strawberry pulp. They find that the jam needs more flavour, colour, and firmness. They also want to know how much sugar is required for 140 lb. jam.* (Sussex.)

A firm set should be obtained with strawberry jam by using pectin if it is applied in the right way and in proper proportion of pulp, sugar, and acid. Canadian strawberry pulp is usually of good quality, and the following recipe is suggested :

40 lb. pulp
66 lb. sugar
14 lb. pectin extract
4 oz. citric or tartaric acid
—
120 lb. 4 oz.

This should be boiled down to 100 lb. of finished product.

The procedure is as follows : If boiling on a stove, use small containers of about 10 lb. capacity.

1. Put the pulp with half the quantity of sugar in a saucepan and boil up.
2. Add the rest of the sugar and boil for about ten minutes with continuous stirring.
3. Add the pectin and acid, bring the mixture to the boil. Excessive boiling spoils the pectin, and three minutes' boiling after the addition of pectin and acid is usually quite sufficient. Fill the jam into jars while still hot.

It is important to note that less than 60 per cent. of sugar will not produce a set with strawberry pulp.

The colour may be improved by using harmless red colour. (Name of suppliers given.)

Breakfast Cereals

B.241. *Required details of processes commonly used for the production of breakfast cereals, in particular the corn-flake type. Also manufacturers of the appropriate machinery.* (Lancs.)

Breakfast cereals in flake form are made of corn, rice, and wheat or their mill products. The grain product is usually tempered, or cooked and tempered, flavoured, flaked, dried, and toasted, but variations exist in the order of these steps and some may be omitted. For corn-flake manufacture the corn grits are produced from white corn on a corn mill using the degerminating process. Only the larger sizes of hominy which have been thoroughly polished to remove all bran are suitable for flaking. The material is first cooked with live steam for about two hours in rotary steam cookers. Flavouring is added at this stage, and may be made from sucrose, salt, and water, or may contain added ingredients such as malt syrup, honey, and the like. The cooked grits are carried to an agitator and are then discharged on to a pan cooler consisting of an open pan equipped with stirrers. The product is next passed to gravity-type driers through which preheated air is blown to reduce the moisture content to approximately 15 per cent. The dried material is held in tempering tanks for several hours in order to permit the residual moisture to become equally distributed; this is essential in order to obtain the uniform toughness necessary for flaking. The tempering period varies, but is generally about 24 hours for corn. The tempered material is next passed through a flaking machine having a pair of water-cooled rolls operating at a pressure of 75 tons. The flakes then go to rotary ovens for toasting. In rotating, the flakes are carried forward until they drop on to a conveyor properly toasted. The flakes are carried to a screening and cooling device and thence to the packing bins. They are then weighed, placed in cartons, and sealed mechanically.

The manufacture of bran flakes, rice flakes, and whole-wheat flakes is carried out by the same methods as described for corn flakes. The cooking temperatures, time allowed for tempering, and the moisture content of the material going to the rolls differ for each cereal.

For puffed breakfast cereals, the grains or dough to be puffed are enclosed in a pressure chamber or puffing gun, and heated, whereby the aqueous vapour pressure is gradually increased; upon suddenly releasing the pressure by opening the gun, the expansion of the water vapour and other gases results in the explosion or enlargement of the product to several times its original volume. The design of puffing guns has been the subject of numerous patents.

Names of manufacturers of the appropriate plant were given.

Information Supplied

B.196. *Information about the manufacture in England of cake and pastry margarine from animal fats such as beef dripping, edible tallow, and oleo extracted from beef dripping.* (London.)

B.197. *Formulæ and technical guidance in the manufacture of sweets and chocolate.* (Ireland.)

B.198. *A formula for the manufacture of peace-time milk chocolate.* (Ireland.)

B.199. *Instructions regarding the preparation and mixing of waffles.* (Lancs.)

B.200. *Information regarding a suitable machine, preferably a perforating machine, for coding pickle and sauce labels.* (Lancs.)

B.204. *Names and addresses of exporters or manufacturers of harmless colours for confectionery.* (South America.)

B.210. *Information on the lye peeling of vegetables.* (Kent.)

B.211. *Names and addresses of the manufacturers of fruit juices.* (Yorks.)

B.216. *Manufacturers of the plant used in "A New Canning System," described in* FOOD MANUFACTURE, *May*, 1945. (Ireland.)

B.217. *Names of suppliers of apple pulp.* (Notts.)

B.218. *Full particulars of a multiple potato-eyeing machine.* (Ireland.)

Recent Patents

These particulars of new patents of interest to readers have been selected from the "Official Journal of Patents," and are published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

Abstracts of Recent Specifications

Improvements in and relating to Machines for Removing the Rind or Skin from Fruit and Pulping the Fruit Preparatory to the Manufacture of Marmalade and other Preserves therefrom

This invention has reference to machines for removing the rind or skin from fruit and pulping the fruit preparatory to the manufacture of marmalade and other preserves therefrom.

The invention has particular reference to machines for this purpose of the type comprising a number of fixed knives, preferably four, between which the fruits are individually placed, a plunger by which the fruit is forced between the knives and thereby cut into sections, pairs of co-operating driven rollers, one roller of each pair having spike-like protuberances to grip the cut fruit and its co-operating roller provided with recesses to receive the pulp of the fruit, means to guide the cut fruit to the nips of the said pairs of rollers, cutting knives positioned to cut the rind or skin from the flesh as the crushed fruit is delivered by the rollers, scrapers to remove the pulp from the recesses, and a grid or other means to receive the separated rind or skin.

564,777. *Robert Wallace Kellie and Kellie and Son, Limited.*

Specifications Published

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

569,238. REVO ELECTRIC CO., LTD., and REEVES, F. H.: Mounting for an electric hot plate or like unit relative to its terminal connexions, particularly applicable to electric ovens or other cooking apparatus.

569,345. STEVENS, A. H. (General Foods Corporation): Flavouring materials and methods of preparing same.

569,549. REYNOLDS, R. F.: Centrifugal honey extractor.

569,597. JANSER, A. M. J., and CLARK, P. C. T.: Method of manufacture of a maltose product from potatoes.

569,790. AKTIEBOLAGET ELEKTROLUX: Hinged supporting shelves of refrigerator cabinets.

569,914. SCHAUL, M. C., and KLEIN, A. J.: Process for the production of food preparations from potatoes and similar farinaceous tubers.

569,915. ABRAHAMS, M. G., WARD, M. A., and LAMSON ENGINEERING CO., LTD.: Apparatus for conveying and treating tins and the like.

569,929. BRITISH THOMSON-HOUSTON CO., LTD.: Vent structure for ovens and the like.

569,932. YOUNG, M. M.: Sealing of preserving jars or the like containers.

569,958. COLVILLES, LTD., and TODD, D.: Safety apparatus for the fuel gas systems of coke oven installations.

570,009. BROOKER, H. G.: An appliance for use in cooking food and other purposes.

Trade Marks

The list of trade marks of interest to readers has been selected from the "Official Trade Marks Journal" and is published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

FANTASY.—631,718. Confectionery (not medicated). **John Mackintosh and Sons, Ltd.,** Albion Mills, Waterside, Halifax, Yorkshire; Manufacturers.

PAGEANT.—631,021. Confectionery (not medicated). **John Mackintosh and Sons, Ltd.,** Albion Mills, Waterside, Halifax, Yorkshire; Manufacturers.

QUALICAF.—632,247. Coffee, coffee essence, and coffee extract. **Saml. Hanson and Son, Ltd.,** 14, Eastcheap, London, E.C. 3; Wholesale Grocers.

OLD LACE.—632,311. Confectionery (not medicated). **Halton, Ltd.,** Vale of Clyde Confectionery Works, Spindlebowe Road, Uddingston, Scotland; Manufacturers.

CLEREX.—632,338. Gelatine for food. **Molcarn, Ltd.,** 14, Cornhill, London, E.C. 3; General Merchants.

GOLDEN GRILL.—632,358. Vinegar. **Fletchers Sauce Company, Ltd.,** The Sauce Works, Barlby Road, Selby, Yorkshire; Manufacturers.

NAMBARRIE.—632,379. Tea. **Pratt and Montgomery, Ltd.,** 54, Victoria Street, Belfast, Northern Ireland; Merchants.

CALDERIA.—632,414. Flour, bread, biscuits (other than biscuits for animals), cakes, and confectionery (not medicated). **John Stevenson (Glasgow), Ltd.,** 142, Calder Street, Glasgow, S. 2, Scotland; Manufacturers and Merchants.

MACOVIS.—632,469. Cereal extracts for use in making macaroni. **Hovis, Ltd.,** 154, Grosvenor Road, Westminster, London, S.W. 1; Millers and Manufacturers.

MAGAS.—633,237. Tea, coffee, and cocoa. **Nathan Pursell McGavin** and **Colin Mackenzie McGavin,** trading as **McGavin and Sclanders,** 9, York Street, Glasgow, C. 2, Scotland; Merchants.

New Companies

Transports (Huddersfield), Limited. (390579.) 8, Cloth Hall Street, Huddersfield. To carry on bus. of transport agents, carriers, etc. Nom. cap.: £5,000 in £1 shares. Dirs.: J. T. Gee, Alpha House, New Hey Road, Outlane, Huddersfield; R. Rothwell, 937, Manchester Road, Linthwaite, Huddersfield; L. Baddeley, Holmfirth; A. Brown, Huddersfield; E. Beaumont, Huddersfield; F. Schofield, Narldon House, Manchester Road, Huddersfield; F. Moorhouse, Huddersfield; F. S. Pontefract, Holmfirth; and S. Smith, Huddersfield.

Scotts Pickles, Limited. (390658.) 25, Redcliffe Street, Sutton-in-Ashfield, Notts. Nom. cap.: £2,000 in £1 shares. Dirs.: H. Scott, 25, Redcliffe Street, Sutton-in-Ashfield; H. Brennand, 26, Alfreton Road, Newton, Derby; A. E. Cripwell, Hilltop, Westfield Lane, Mansfield.

P. J. Viner (Thornton Heath), Limited. (390730.) 846, London Road, Thornton Heath, Surrey. To take over the bus. of a baker and confectioner carried on by Percival J. Viner at Thornton Heath. Nom. cap.: £3,000 in £1 shares. Dirs.: P. J. Viner and Hilda M. Viner, both of 22, Church Way, Sanderstead, Surrey.

Jaffajuice (Sales), Limited. (390723.) 4, Brabant Court, Philpot Lane, E.C. 3. To carry on bus. of dealers in citrus fruit juices, products and by-products, etc. Nom. cap.: £1,000 in £1 shares. Dirs.: A. Goldberg, 8, Bruce Road, Pollockshields, Glasgow; L. L. Goldberg, 77, Maitland Court, Lancaster Gate, W. 2.

F. C. Crutchley and Co., Limited. (390751.) 304, Deansgate, Manchester 3. To carry on bus. of elec. refrigeration and general engineers, etc. Nom. cap.: £2,000 in £1 shares. Dirs.: F. J. Crutchley, 28, Castelton Avenue, Lostock, Stretford; P. R. Crowther and C. H. Ellis, both of 22, Mayfield Road, Manchester.

Taken from the Daily Register, compiled by Jordan and Sons, Limited, Company Registration Agents, 116, Chancery Lane, London, W.C. 2.